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32-Bit

Microcontroller

TriBoard TC1798

Hardware: TriBoard-TC1798 V1.0
Hardware Manual

User's Manual

V 1.0 2010-01

Microcontrollers

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TriCore Evalboard

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1 Introduction

We congratulate you on your purchase of the TriCore Evaluation Board. This kit is a versatile tool, providing quick access to the capabilities of TriCore's powerful architecture.

Applications can be developed easily. The Evaluation Board is equipped with a variety of memories and peripherals for connection to the environment. There is also an interface for the On Chip Debugging Features (OCDS1 and DAP). The kit also includes several sets of development tools, which are stored on the included Evaluation Board CD-ROM.

The Evaluation Board allows easily the development of TriCore applications with the corresponding tools.

Subsequently, the applications can be downloaded and can be tested with the powerful debugger software.

This TriBoard Hardware Manual familiarizes you with the TriCore Evaluation Board and guides you through the initial configuration of the TriBoard.

For detailed technical information about the TC1798 please refer to the User Manual of the device.

2 TriBoard Features

2.1 Summary of Features

- Infineon's TC1798 Controller in LFBGA516 Package
- Infineon's TC1791 Controller in LFBGA292 Package
- Burst Flash up to 16MBytes (not with TC1791)
- asynchronous SRAM up to 1MByte (not with TC1791)
- synchronous SRAM up to 8 MByte (not with TC1791)
- FlexRay Transceivers
- High Speed CAN Transceivers
- USB to UART bridge
- Crystal 20MHz (default), Oscillator or External Clock
- USB miniWiggler JDS for easy debugging
- 8 Low Power Status LEDs
- 8-DIP switches for configuration
- access to all pins of controller
- 100mm x 160mm (EURO-Board)

Connectors

The TC1798 TriBoard offers a wide variety of connectors:

- Standard power connector
- USB connector for ASC Interface (ASC0) and miniWiggler
- 16-pin header for JTAG interface (OCDS)
- 10-pin header for DAP
- 2 x 10pin (2x5) Header for CAN High Speed Transceiver (CAN0 and CAN1)
- 2 x SUB-D9 Plug connector for FlexRay
- five 80-pin connectors (male) + five 80-pin connectors (female) with all I/O signals
- optional ETK connector

Components

- Infineon's Next generation micro controller supply TLE 7368-E (TLE7368-3E if available)
- Three LEDs to validate power supply (5Volt / 3,3 Volt / VCORE)
- LED indicating /HDRST (ESR0) active state
- LED indicating activ miniWiggler JDS
- LED switched via DAS software
- 2x FlexRay Transceiver AS8221(AMS) or TJA1080 (NXP)
- 2 x Infineon's High Speed CAN-Transceiver TLE 6250 GV33
- USB to UART bridge FT2232HL (FTDI)
- SPI eeprom (Atmel)

Zero Ohm Bridges

Zero Ohm resistors give the flexibility to configure the systems functionality

2.2 Block Diagram

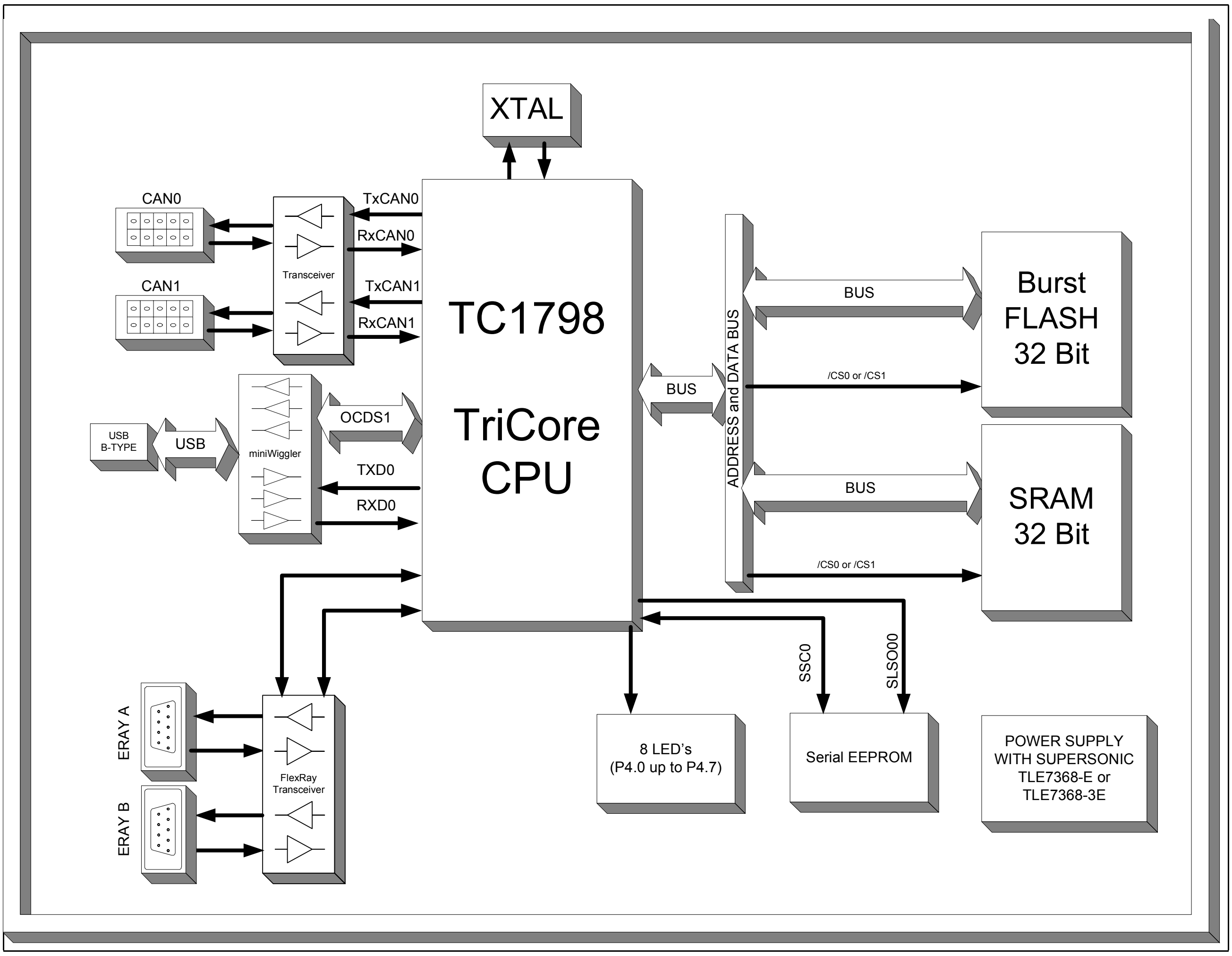


Figure 2-1 TriBoard Block Schematic

2.3 Placement

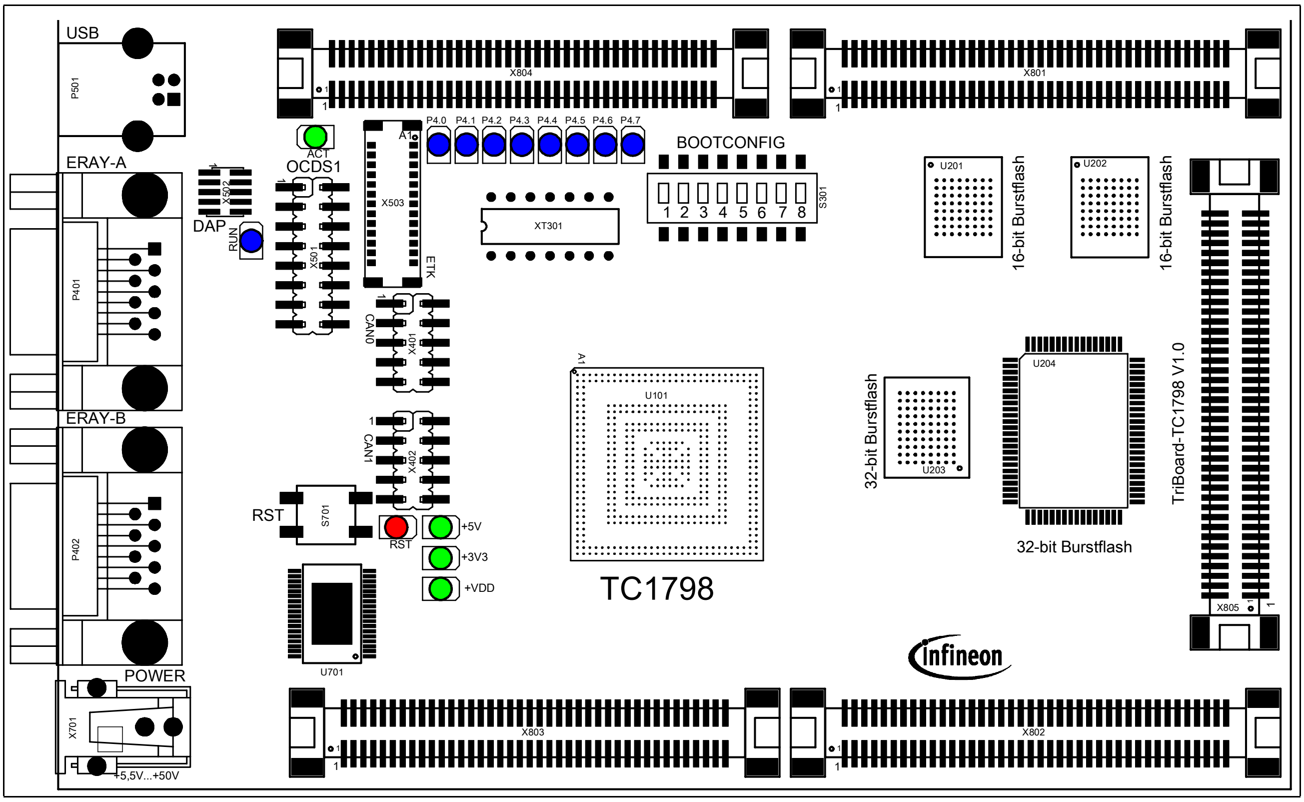


Figure 2-2 TriBoard TC1798 V1.0 Placement

3 TriBoard Information

3.1 Power Supply

The Board has to be connected to a +5,5V to +50V DC power supply. The TriBoard generates internally +3.3V, +VDD and +5V. The power consumption is not specified yet but a supply with 6V and 500mA should be sufficient. The pinout for the supply connector is shown in **Figure 7-4**. There can be used any standard power pack with a connector where the positive line is surrounded by the ground line.

+VDD is +1,3V.

Applying a stable supply voltage causes the power on reset after a short period. The four LED's (+5V, +3.3V, +VDD) indicate the status of the on board generated voltage (if the LEDs are assembled).

A manual reset is executed by pressing the reset button.

3.2 LEDs

There are 14 on board:

– D501 up to D508 (blue) -> toogle LEDs connected to P4.0 ... P4.7
– D604 RST (red) -> RESET LED indicate the reset state of the board
– D505 +VDD (green) -> +VDD power supply indication (+1.3V)
– D606 +3V3 (green) -> +3,3V power supply indication
– D607 +5V (green) -> +5V power supply indication
– D402 ACT (green) -> on board miniWiggler JDS is ACTIV
– D401 RUN (blue) -> Debug RUN mode (switched by DAS Server)

3.3 Clock

There are three possibilities to apply the CPU clock.

- Large oscillator circuit (DIP14)
- Small oscillator circuit (DIP8)
- Crystal (default with 20MHz)
- External clock generator

The crystal oscillator and the oscillator circuit use the socket XT301. It's possible to apply a 14pol DIP oscillator package or an 8pol DIP oscillator package.

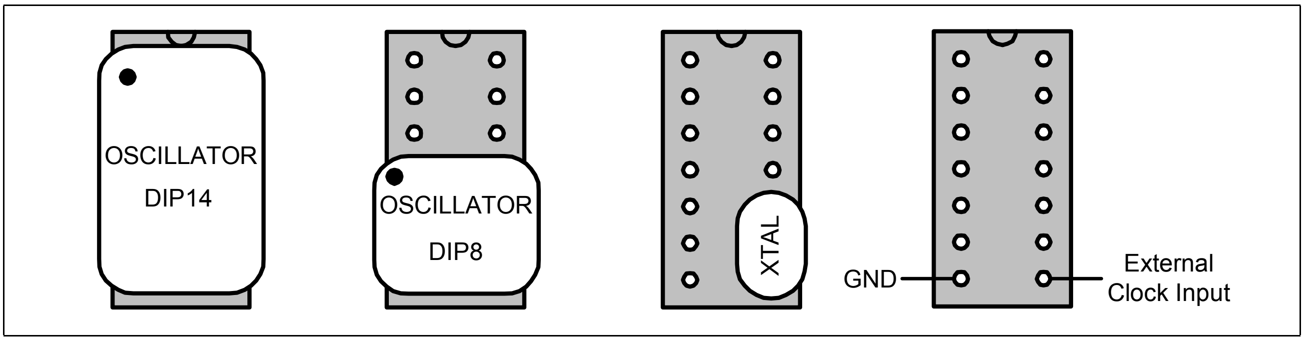


Figure 3-1 Clock socket usage (XT301)

3.4 Memory (not with TC1791)

The TriBoard supports the following memory configurations:

- up to 8 MBytes external Burst Flash (2x16Bit) or
- 4 MBytes external Burst Flash (1x32Bit) or
- up to 4MBytes external Burst Flash (1x16Bit)
- 1 MBytes external asynchronous SRAM (2x16Bit) or
- up to 8 MBytes external synchronous SRAM (1x32Bit) or
- 512 KBytes external asynchronous SRAM (1x16Bit)

For the OnBoardMemory are reserved chip select 0 and 1. Therefore only two parts, e.g. 2x16Bit Flash and 2x16Bit asynchronous SRAM, should be assembled and can be used at the same time. Chip Select 2 and 3 are not used on the board and can be used externally.

The Board supports programming though the JTAG port (OCDS1).

3.5 FLASH

The flash uses 32 Data Bits (AD0...AD31) and 20, 21 or 22 Address Bits (A0...A19,A20 or A21). It's accessed via /CS0 or /CS1. Each type of flash has its own resistor to connect to /CS0 or /CS1. To connect different flashs see **Table 4-4**.

Note: Only +3,3V Flash is usable with this board.

3.6 SRAM

The SRAM uses 32 Data Bits (AD0...AD31) and up to 22 Address Bits (A0...A20).

It's accessed via /CS0 or /CS1. Each type of SRAM has its own resistor to connect to /CS0 or /CS1. To connect different SRAMs see **Table 4-4**.

Note: Only +3,3V SRAM is usable with this board.

3.7 USB Connector

The USB connector is used for connection to a PC. Via the USB it is possible to power the board, using the ASC0 as serial connection via USB and Debugging via DAS. For the pinout of USB socket see **Figure 7-5**.

NOTE: Before connecting the board to the PC, make sure that the actual DAS software is installed on the PC. For actual DAS software please contact your local FAE.

The software can also be found on the

DAS website

3.7.1 Serial Connection to PC

After the first connection of USB to a PC the needed driver will be installed automatically. During this there will be created a new COM port on PC. This COM port can be used to communicate with the board via ASC0 of the device (e.g. bootstrap loader).

3.7.2 miniWiggler JDS

The miniWiggler JDS is a low cost debug tool which allows you access to the JTAG of the device. Make sure that you have the latest DAS release. Debugging is possible via the DAS Server 'UDAS'. Please contact your prefered debug vendor for support of DAS.

If you have connected the board to the PC and there runs the DAS server, then a working connection is visible via the blue ACTIV LED.

The status RUN LED is switched on/off through the DAS Server, depending on the used debugger (client).

IMPORTANT: Make sure that there is no or a tristated connection on X501 (OCDS1) and X502 (DAP) if the ACTIV LED is on.

3.8 FlexRay

he board has 2 SUB-D connectors for FlexRay Communication with up to 10 Mbit/s. For the pinout of the plugs see **Figure 7-5**.

The transceiver are connected directly to the TriCore device.

For more information look in the user manual for TC1798.

3.9 Serial Eeprom

The SSC0 of the TC179X is connected to a serial EEPROM with a size of 128K (16.384 x 8). As chip select for this EEPROM is used the line SLSO00 (P10.4). To disconnect (disable) the EEPROM remove resistor R453.

3.10 MultiCAN

On the board are two CAN transceiver connected to the MultiCAN on TC1798 node 0 and 1. The transceivers are connected to two IDC10 plug. For the pinout of IDC10 plug see **Figure 7-7**. You can use a IDC female connector with crimpconnector, flat cable and SUB-D 9 plug with crimpconnector to have a 1:1 adapter to SUB-D 9.

3.11 Other peripherals

For all other peripherals there are no special plugs on the board. The peripheral signals are available on the different connectors. See **"Connector for TC1798 - Pinout (Part I, Top View)" on Page 7-2**, **"Connector for TC1798 - Pinout (Part II, Top View)" on Page 7-3** and **"Connector for TC1798 - Pinout (Part III, Top View)" on Page 7-4**.

Note: - SLSO00 is used as chip select for the serial eeprom on board.

3.12 Toggle LED's

Port 3 pin 0 up to pin 7 are connected to single LED's (D601... D608) and can be controlled by Software. This status LED's are low active.

3.13 Debug System

3.13.1 OCDS1

The OCDS1 signals are connected to the IDC16 plug (X501). They work with the port supply of +3.3V. For pinout of the connector see **Figure 7-6**. You can connect any debugger to this connector.

The signals /BRKIN and /BRKOUT are not connected per default. If you need this signals in the connector then assemble R525 and R524 with a 0R resistor.

If you connect a debug hardware make sure that the miniWiggler JDS (see **"miniWiggler JDS" on Page 3-3**) is not activ (ACTIV LED is off) and on the DAP connector (X502) is no hardware connected or the hardware is tristated.

If the ACTIV LED is on, then stop the active DAS Server 'UDAS' and/or remove the USB connection to the PC.

3.13.2 DAP

The board comes with a DAP connector (X502). For pinout of this connector see **Figure 7-8**. You can connect a DAP hardware here. If you use this connector make sure that the miniWiggler JDS is not activ (ACTIV LED is off) and a connected OCDS1 hardware is disconnected or tristated.

4 TriBoard Configuration

4.1 HW Boot Configuration TC1798

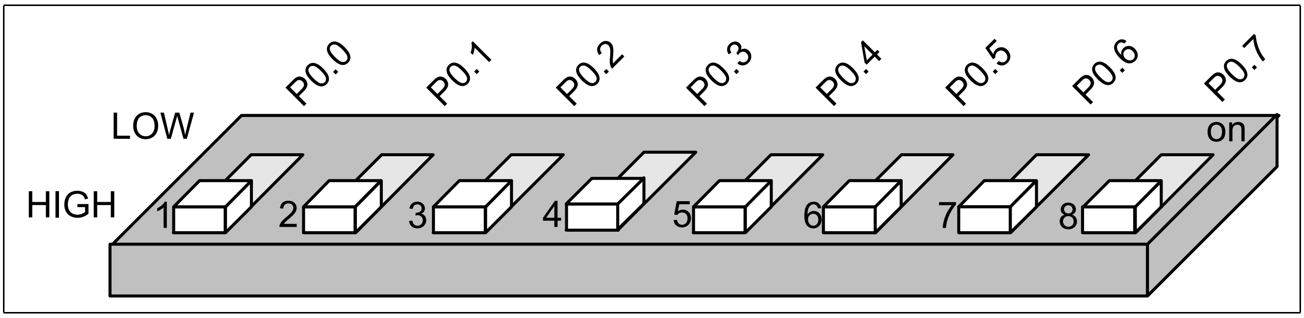


Figure 4-1 HW Configuration TC1798 DIP-Switch

The picture above shows the definition of the boot HW configuration switch. The meaning of the switches will be described in the following table (**Table 4-1**).

Note: The ON position of the switch is equal to a logical LOW at the dedicated pin.

Table 4-1 User Startup Modes for TC1798

Note: The shadowed line indicates the default setting.

Note: 'x' represents the don't care state.

Note: 1 to 8 are the Dip Switch numbers

HWCFG[7...0]	Type of Boot TC1798	1	2	3	4	5	6	7	8
11XXXXXX	Internal Start from Flash	X	X	X	X	X	X	OFF	OFF
011XXXXX	Internal Start from Flash	X	X	X	X	X	OFF	OFF	ON
010XXXXX	Bootstrap Loader Mode, Generic Bootloader at CAN pins	X	X	X	X	X	ON	OFF	ON
10101XXX	Bootstrap Loader Mode, ASC Bootloader	X	X	X	OFF	ON	OFF	ON	OFF
10100XXX	Internal Alternate Boot Mode, ASC Bootloader on fail	X	X	X	ON	ON	OFF	ON	OFF

Table 4-1 User Startup Modes for TC1798

Note: The shadowed line indicates the default setting.

Note: ’x’ represents the don’t care state.

Note: 1 to 8 are the Dip Switch numbers

HWCFG[7...0]	Type of Boot TC1798	1	2	3	4	5	6	7	8
1011XXXX	Internal Alternate Boot Mode, Generic Bootloader at CAN pins on fail	X	X	X	X	OFF	OFF	ON	OFF
1000XXXX	Internal Alternate Boot Mode, Generic Bootloader at CAN pins on fail	X	X	X	X	ON	ON	ON	OFF
1001011X	External Alternate Boot Mode (EBU arbiter), ASC Bootloader on fail	X	OFF	OFF	ON	OFF	ON	ON	OFF
1001010X	External Alternate Boot Mode (EBU participant), ASC Bootloader on fail	X	ON	OFF	ON	OFF	ON	ON	OFF
1001001X	External Alternate Boot Mode (EBU arbiter), ASC Bootloader on fail, FNA mode	X	OFF	ON	ON	OFF	ON	ON	OFF
1001000X	External Alternate Boot Mode (EBU participant), ASC Bootloader on fail, FNA mode	X	ON	ON	ON	OFF	ON	ON	OFF
1001111X	External Alternate Boot Mode (EBU arbiter), Generic Bootloader at CAN pins on fail	X	OFF	OFF	OFF	OFF	ON	ON	OFF
1001110X	External Alternate Boot Mode (EBU participant), Generic Bootloader at CAN pins on fail	X	ON	OFF	OFF	OFF	ON	ON	OFF
1001101X	External Alternate Boot Mode (EBU arbiter), Generic Bootloader at CAN pins on fail, FNA mode	X	OFF	ON	OFF	OFF	ON	ON	OFF
1001100X	External Alternate Boot Mode (EBU participant), Generic Bootloader at CAN pins on fail, FNA mode	X	ON	ON	OFF	OFF	ON	ON	OFF

Table 4-1 User Startup Modes for TC1798

Note: The shadowed line indicates the default setting.

Note: 'x' represents the don't care state.

Note: 1 to 8 are the Dip Switch numbers

HWCFG[7...0]	Type of Boot TC1798	1	2	3	4	5	6	7	8
0010011X	External Start from /CS0 (EBU arbiter), Default EBU Configuration	X	OFF	OFF	ON	ON	OFF	ON	ON
0010111X	External Start from /CS0 (EBU arbiter), Automatic EBU Configuration	X	OFF	OFF	OFF	ON	OFF	ON	ON
0010001X	External Start from /CS0 (EBU arbiter), Default EBU Configuration, FNA mode	X	OFF	ON	ON	ON	OFF	ON	ON
0010101X	External Start from /CS0 (EBU arbiter), Automatic EBU Configuration, FNA mode	X	OFF	ON	OFF	ON	OFF	ON	ON
0010010X	External Start from /CS0 (EBU participant), Default EBU Configuration	X	ON	OFF	ON	ON	OFF	ON	ON
0010110X	External Start from /CS0 (EBU participant), Automatic EBU Configuration	X	ON	OFF	OFF	ON	OFF	ON	ON
0010000X	External Start from /CS0 (EBU participant), Default EBU Configuration, FNA mode	X	ON	ON	ON	ON	OFF	ON	ON
0010100X	External Start from /CS0 (EBU participant), Automatic EBU Configuration, FNA mode	X	ON	ON	OFF	ON	OFF	ON	ON
0001X00X	Bootstrap Loader Mode, Generic Bootloader at CAN pins, FNA mode	X	ON	ON	X	OFF	ON	ON	ON
0001X01X	Bootstrap Loader Mode, ASC Bootloader, FNA mode	X	OFF	ON	X	OFF	ON	ON	ON

Table 4-1 User Startup Modes for TC1798

Note: The shadowed line indicates the default setting.

Note: 'x' represents the don't care state.

Note: 1 to 8 are the Dip Switch numbers

HWCFG[7...0]	Type of Boot TC1798	1	2	3	4	5	6	7	8
0001X10X	External ABM, Generic Bootloader, Default EBU Configuration, FNA mode	X	ON	OFF	X	OFF	ON	ON	ON
0001X11X	External ABM, ASC Bootloader, Default EBU Configuration, FNA mode	X	OFF	OFF	X	OFF	ON	ON	ON
all others	reserved; don't use this combination								

4.2 Assembly Options

Table 4-2 General optional resistors

Component	Description
R305	XTAL Rserial (default: assembled)
R306	XTAL Rparallel (default: not assembled)
R523	Connect /BRKOUT with miniWiggler JDS (default: not assembled)
R524	Connect /BRKOUT with OCDS1 connector (default: not assembled)
R527	Connect /BRKIN with USR1 of miniWiggler JDS (default: not assembled
R529	Connect /BRKIN with USR1 of DAP (default: not assembled
R525	Connect /BRKIN with OCDS1 connector(default: not assembled)
R528	Connect /TESTMODE with USR1 of miniWiggler JDS (default: not assembled
R530	Connect /TESTMODE with USR1 of DAP (default: not assembled
R526	Connect /TESTMODE with OCDS1 connector(default: not assembled)
R532	Connect debug reset with /PORST(default: assembled)
R531	Connect debug reset with /HDRST (default:not assembled)
R610	Connect +3,3V to all toggle LEDs (default: assembled)
R723	Connect reset switch with /PORST(default: assembled)
R724	Connect reset switch with /HDRST (default:not assembled)
R704	Connect P1.2 with MONSTBY of power device (default: not assembled)
R706	Connect P1.3 with WDO of power device (default: not assembled)
R709	Connect P1.15 with WDI of power device (default: not assembled)

Note: All resistors are red marked in the following figures

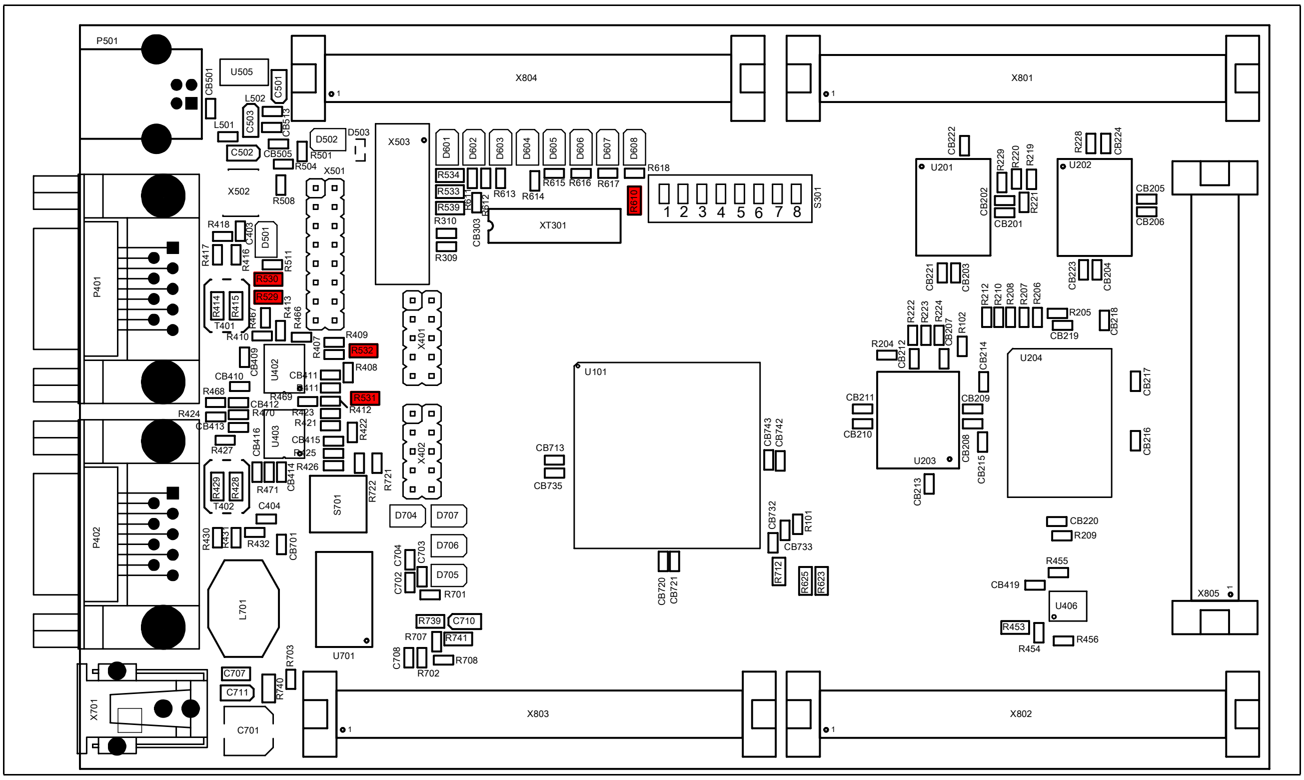


Figure 4-2 Location of general optional resistors on Top Side

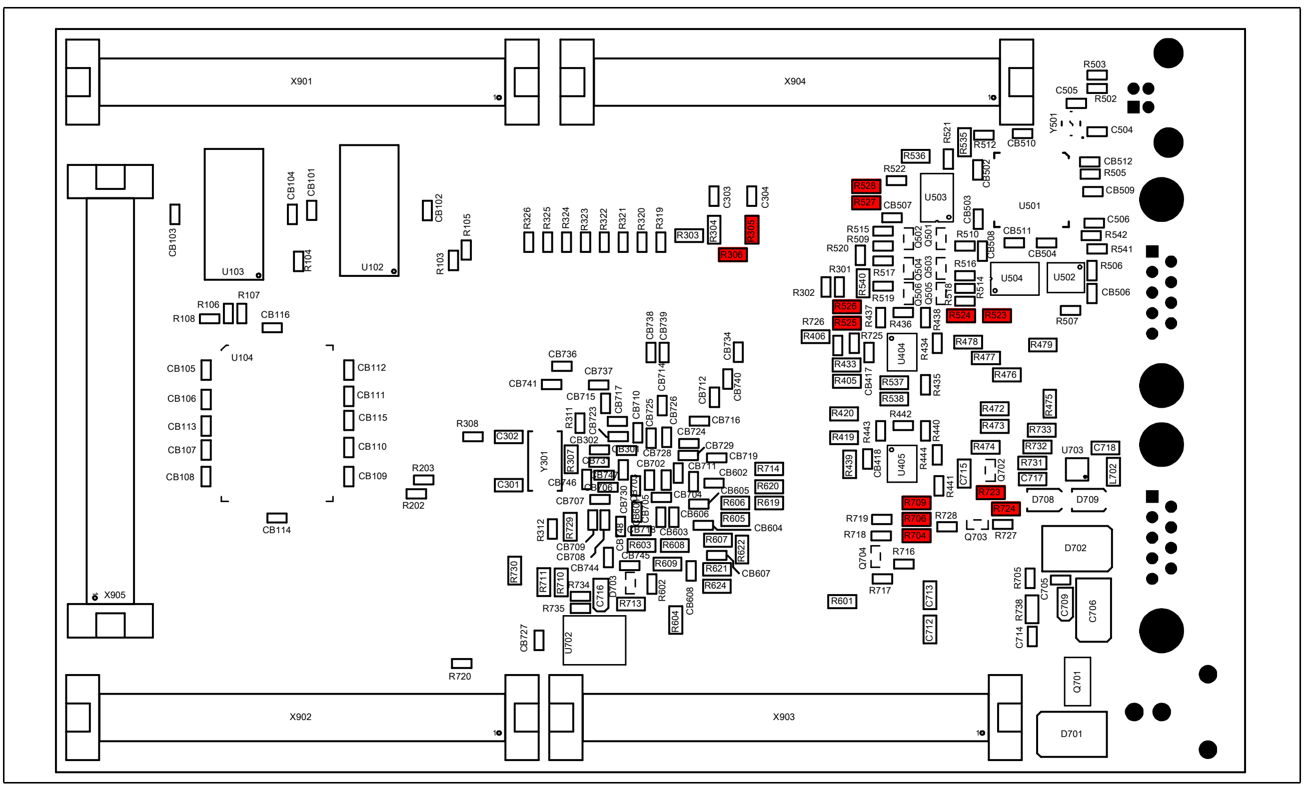


Figure 4-3 Location of general optional resistors on Bottom Side

Table 4-3 Resistors for peripherals

Component	Description
R433	Connect P6.8 with RXD of CAN0 transceiver (default: assembled)
R439	Connect P6.10 with RXD of CAN1 transceiver (default: assembled)
R453	Connect P10.4 (SLSO0) with /CS of Eeprom (default: assembled)
R540	Connect P5.0 with TXD of USB to UART (default: assembled)
R605	Connect VAREF0 with VDDM (default: assembled)
R607	Connect VAGND0 with VSSM (default: assembled)
R606	Connect VAREF1 with VDDM (default: assembled)
R622	Connect VAGND1 with VSSM (default: assembled)
R621	Connect VAREF2 with VDDM (default: assembled)
R623	Connect VAGND2 with VSSM (default: assembled)
R624	Connect VAREF3 with VDDM (default: assembled)
R625	Connect VAGND3 with VSSM (default: assembled)
R608	Connect VFAREF with VDDMF (default: assembled)
R609	Connect VFAGND with VSSMF (default: assembled)
R619	Connect +5V with VDDM (default: assembled)
R620	Connect +3,3V with VDDM (default: not assembled)

Note: All resistors are red marked in the following figures

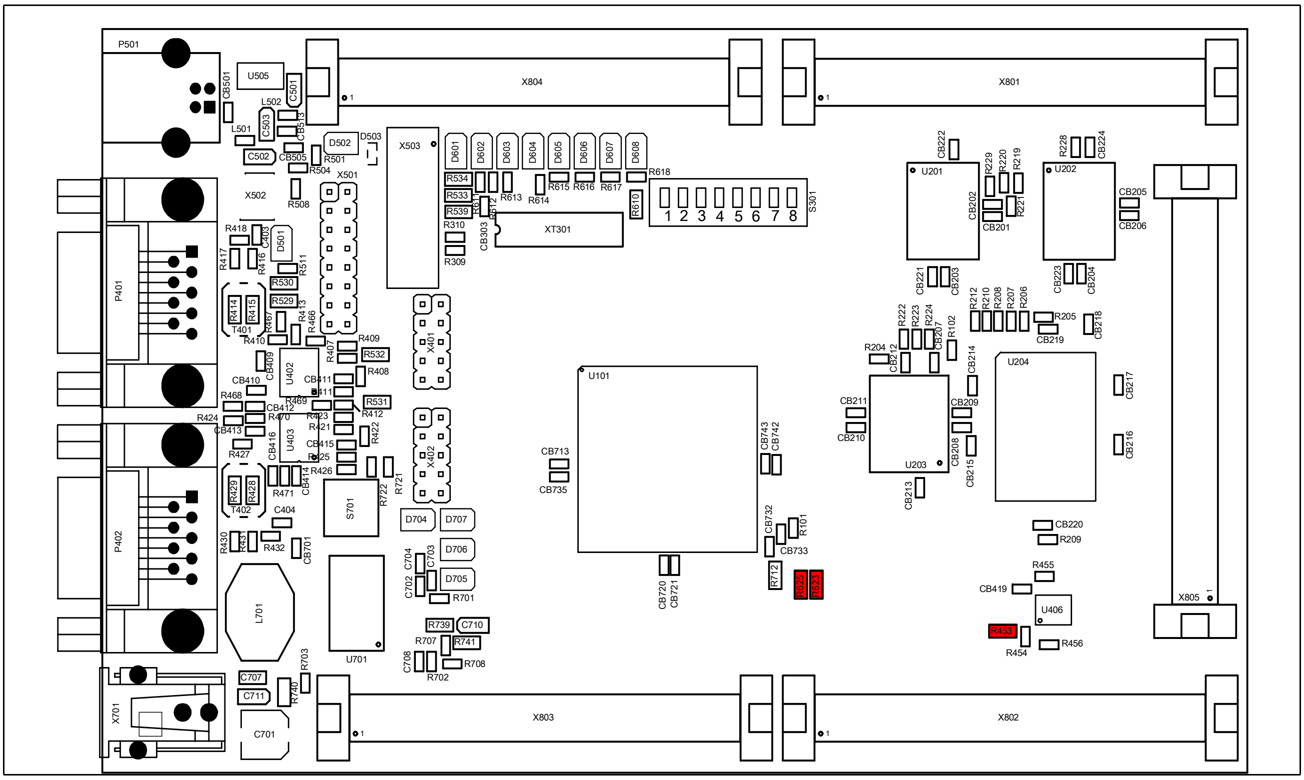


Figure 4-4 Location of peripheral resistors on Top Side

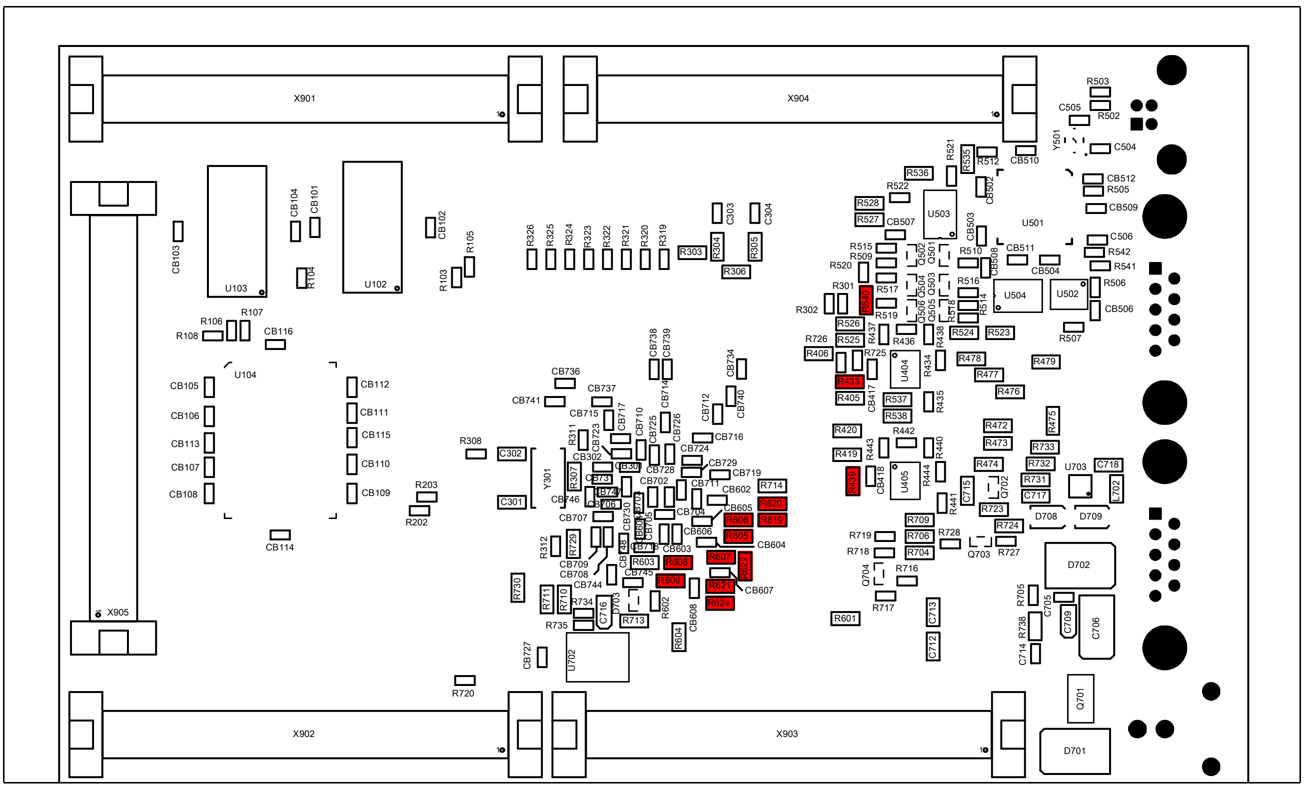


Figure 4-5 Location of peripheral resistors on Bottom Side

Table 4-4 Resistors for memories

Component	Description
R103	Connect /CS1 to 16-bit SRAMs (default: assembled)
R104	Connect /CS0 to 16-bit SRAMs (default: not assembled)
R106	Connect /CS1 to 32-bit SRAM (default: not assembled)
R107	Connect /CS0 to 32-bit SRAM (default: not assembled)
R219	Connect /CS0 to 16-bit Flashs (default: assembled)
R220	Connect /CS1 to 16-bit Flashs (default: not assembled)
R222	Connect /CS0 to 32-bit BGA Flash (default: not assembled)
R223	Connect /CS1 to 32-bit BGA Flash (default: not assembled)

Note: All resistors are red marked in the following figures

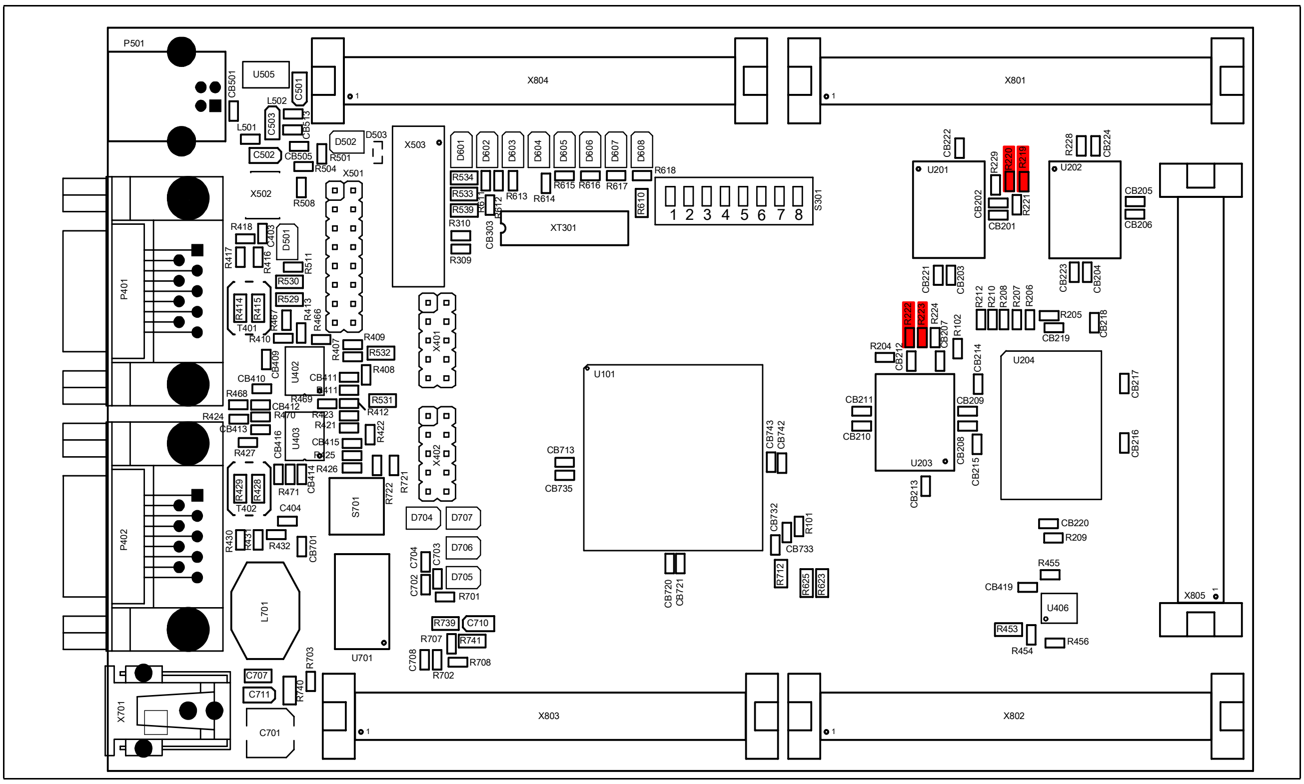


Figure 4-6 Location of memories resistors on Top Side

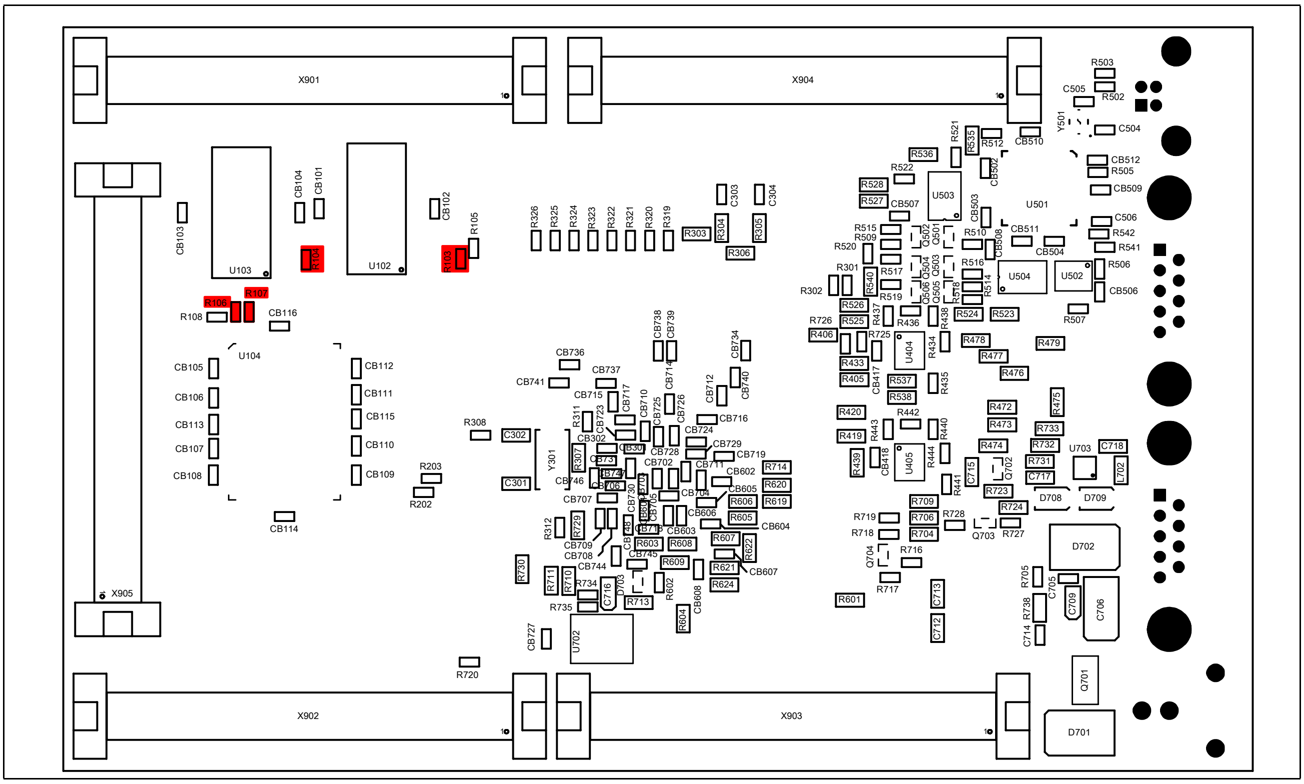


Figure 4-7 Location of memories resistors on Bottom Side

5 TriBoard Software

5.1 Requirements

To install the software from your TriBoard CD you need a PC with Windows95/98/ME, Windows 2000, Windows XP or Windows Vista.

5.2 Software Overview

The CD does not contain any tool. For the availablity for Demo Versions of the different Tools, please contact the toolvendor directly (e.g. Tasking, Hitex, Lauterbach, GreenHills, HighTec...). To install tools for compiling and debugging use seperat CD's from Toolvendors. There are also some application notes and software examples. The data sheets of all used parts can be found in the "TriBoard_Components" directory. The manuals for the microcontrollers and the TriBoard are located in the "Manual" folder. Some useful tools like Acrobat Reader are stored in the "Utilities" directory.

The current Errata Sheet can be found in the directory "Errata Sheet". To make sure you have always the most recent one, please contact your local FAE.

Note: For more details see the file ReadMe.txt.

5.3 Software Installation

To install tools for the TriCore insert the CD from the Toolvendor and start the file "setup.exe" if the CD is not automatically started. Follow the instructions of the installationprogram.

6 Signal Description

For more information about the signals please see the user manuals from TC1798.

Table 6-1 Power Signals

Short Name	Description
VCC_IN	Supply Input (5,5V...50V)
GND	Ground
VDD	Core Supply Voltage (1,3V)
VDDP	Port Supply Voltage (3,3V)
VDDE	External Bus Supply Voltage (3,3V)
VDDFL3	Flash Supply Voltage (3,3V)
VDDESB	Emulation Stand-by SRAM Supply Voltage (1,3V)
VDDOSC	Main Oscillator Supply Voltage (1,3V)
VDDOSC3	Main Oscillator Supply Voltage (3,3V)
VSSOSC	Main Oscillator Ground
VDDPF	E-Ray PLL Supply Voltage (1,3V)
VDDPF3	E-Ray PLL Supply Voltage (3,3V)
VSSM	ADC Analog Part Ground
VDDM	ADC Analog Part Supply Voltage (5V or 3,3V)
VSSMF	FADC Analog Part Ground
VDDMF	FADC Analog Part Supply Voltage (3,3V)
VDDAF	FADC Analog Part Logic Supply Voltage (1,3V)
VAGND0	ADC0 Reference Ground
VAREF0	ADC0 Reference Voltage (VDDM)
VAGND1	ADC1 Reference Ground
VAREF1	ADC1 Reference Voltage (VDDM)
VAGND2	ADC2 Reference Ground
VAREF2	ADC2 Reference Voltage (VDDM)
VAGND3	ADC3 Reference Ground
VAREF3	ADC3 Reference Voltage (VDDM)
VFAGND	FADC Reference Ground
VFAREF	FADC Reference Voltage (VDDMF)

Table 6-2 Reset Signals

Short Name	Description
/PORST	External Power On Reset
/ESR0_/HDRST	Hardware Reset (/ESR0)

Table 6-3 Interrupt Signals

Short Name	Description
/ESR1_/NMI	Non Maskable Interrupt (/ESR1)
REQ[0...3] / P1[0...3]	External Trigger Input 0...3
REQ[4...5] / P7[0...1]	External Trigger Input 4...5
REQ[6...7] / P7[4...5]	External Trigger Input 6...7

Table 6-4 Clock Signals

Short Name	Description
XTAL1	Crystal Oscillator Input
XTAL2	Crystal Oscillator Output
BFCLKO	Burst Mode Flash Clock Output
BFCLKI	Burst Mode Flash Clock Input
DDRCLK	Double Data Rate Flash Clock
DDRCLKN	Inverted Double Data Rate Flash Clock

Table 6-5 BUS Signals

Short Name	Description
D[0...31]	Data Bus
A[0...23]	Address Bus

Table 6-6 BUS Control Signals

Short Name	Description
/CS[0...3]	Chip Selects
/CSCOMB	Combined Chip Select Output
/BC[0...3]	Byte Controls
/RD	Read

Table 6-6 BUS Control Signals

/WR	Write
MR/W	Motorola-style Read/Write
/BAA	Burst address advance output
/ADV	Address Valid
/BREQ	Bus Request Output
/HOLD	Hold Request Input
/HLDA	Hold Acknowledge
/WAIT	Wait Input
/RAS	Row Address Select/Strobe
/CAS	Colum Address Select/Strobe
CKE	Clock Enable
DQS0	Data Strobe Signal 0
DQS1	Data Strobe Signal 1
DQS2	Data Strobe Signal 2
DQS3	Data Strobe Signal 3

Table 6-7 Debug Signals

Short Name	Description
/TRST	Test Reset
TCK / DAP0	Test Clock / Device Access Port Line 0
TMS / DAP1	Test Mode Select / Device Access Port Line 1
TDI	Test Data Input
TDO / DAP2	Test Data Output / Device Access Port Line 2
TESTMODE	Test Mode Select Input
/BRKIN	TriCore Breakpoint Input
/BRKOUT	TriCore Breakpoint Output

Table 6-8 Peripheral Signals

Short Name	Description
P5.0	Receive Data ASC0
P5.1	Transmit Data ASC0
P5.2	Receive Data ASC1

Table 6-8 Peripheral Signals

P5.3	Transmit Data ASC1
SCLK0 / P10.3	Clock Line SSC0
MRST0 / P10.0	Master Receive / Slave Transmit SSC0
MTSR0 / P10.1	Master Transmit / Slave Receive SSC0
SLSI0 / P10.2	Slave Select Input SSC0
SLSO0 / P10.4	Slave Select Output 0 (SSC0)
SLSO1 / P10.5	Slave Select Output 1 (SSC0)
P6.6	Clock Line SSC1
P6.5	Master Receive / Slave Transmit SSC1
P6.4	Master Transmit / Slave Receive SSC1
P6.7	Slave Select Input SSC1
P2[2..7]	Slave Select Output 2..7
P6.9	CAN Transmitter Output 0
P6.8	CAN Receiver Input 0
P6.11	CAN Transmitter Output 1
P6.10	CAN Receiver Input 1
P6.13	CAN Transmitter Output 2
P6.12	CAN Receiver Input 2
P6.15	CAN Transmitter Output 3
P6.14	CAN Receiver Input 3
P0 [0...7]	General Purpose I/O Port 0 (HWCFG)
P0.8	General Purpose I/O Port 0.8
P0.15	General Purpose I/O Port 0.15
P0.14	E-Ray Channel A transmit Data Output
P0.10	E-Ray Channel A transmit Data Output enable
P0.9	E-Ray Channel A Receive Data Input 0
P0.12	E-Ray Channel B transmit Data Output
P0.11	E-Ray Channel B transmit Data Output enable
P0.13	E-Ray Channel B Receive Data Input 0
P1[12...15]	General Purpose I/O Port 1.12...1.15
P2[8...15]	General Pupose I/O Port 2

Table 6-8 Peripheral Signals

P3[0...15]	General Pupose I/O Port 3
P4[0...15]	General Pupose I/O Port 4
P9[0...14]	General Pupose I/O Port 9
P10[0...5]	General Pupose I/O Port 10
P18[0...7]	General Pupose I/O Port 18
AN[0...71]	Analog Inputs
P7[2...3]	ADC0 External Multiplexer Control
P7[6...7]	ADC1 External Multiplexer Control
FCLP0A / P5.11	MSC0 differential driver clock output positive A
FCLN0 / P5.10	MSC0 differential driver clock output negative
SOP0A / P5.9	MSC0 differential driver serial data output positive A
SON0 / P5.8	MSC0 differential driver serial data output negative
EN00 / P5.4	MSC0 device select output 0
SDI0 / P5.5	MSC0 serial data input
P5.15	MSC1 differential driver clock output positive A
P5.14	MSC1 differential driver clock output negative
P5.13	MSC1 differential driver serial data output positive A
P5.12	MSC1 differential driver serial data output negative
P5.6	MSC1 device select output 0
P5.7	MSC1 serial data input
P1.8	MLI0 receive channel clock
P1.9	MLI0 receive channel ready output
P1.10	MLI0 receive channel valid input
P1.11	MLI0 receive channel data input
P1.4	MLI0 transmit channel clock
P1.5	MLI0 transmit channel ready input
P1.6	MLI0 transmit channel valid output
P1.7	MLI0 transmit channel data output
P8.4	MLI1 receive channel clock
P8.5	MLI1 receive channel ready output
P8.6	MLI1 receive channel valid input

Table 6-8 Peripheral Signals

P8.7	MLI1 receive channel data input
P8.0	MLI1 transmit channel clock
P8.1	MLI1 transmit channel ready input
P8.2	MLI1 transmit channel valid output
P8.3	MLI1 transmit channel data output

7 Connector Pin Assignment

The TriBoard will be shipped with five male (plug) connectors on top layer and five female (socket) connectors on bottom layer. The default connectors are 80-pol. Board to Board connectors from Samtec:

http://www.samtec.com

Plug:

FTSH-140-02-L-DV-ES-A

Socket:

FLE-140-01-G-DV-A

Note: All connectors are pincompatible as a superset of TriBoard TC179X V5.X.

7.1 TC1798 Connector / Top View

BUS EXPANSION (X801,X901)

Signal	Pin	Pin	Signal
GND	1	2	GND
GND	3	4	GND
D0	5	6	
D1	7	8	
D2	9	10	A0
D3	11	12	A1
D4	13	14	A2
D5	15	16	A3
D6	17	18	A4
D7	19	20	A5
D8	21	22	A6
D9	23	24	A7
D10	25	26	A8
D11	27	28	A9
D12	29	30	A10
D13	31	32	A11
D14	33	34	A12
D15	35	36	A13
D16	37	38	A14
D17	39	40	A15
D18	41	42	A16
D19	43	44	A17
D20	45	46	A18
D21	47	48	A19
D22	49	50	A20
D23	51	52	A21
D24	53	54	A22
D25	55	56	A23
D26	57	58	/CS2
D27	59	60	/CS1
D28	61	62	/CS0
D29	63	64	/BC3
D30	65	66	/BC2
D31	67	68	/BC1
/RD	69	70	/BC0
/WR	71	72	/CSCOMB
MR/W	73	74	/CAS
/HLDA	75	76	/WAIT
/RAS	77	78	/BREQ
/HOLD	79	80	/CS3

PERIPHERALS (X802,X902)

Signal	Pin	Pin	Signal
GND	1	2	GND
GND	3	4	GND
VCC_IN	5	6	VCC_IN
VCC_IN	7	8	VCC_IN
/ADV	9	10	/BAA
BFCLKO	11	12	DDRCLK
P0.5	13	14	DDRCLKN
/ESR1	15	16	/ESR0
DSQ0	17	18	DSQ1
GND	19	20	GND
P0.6	21	22	/PORST
P0.7	23	24	P0.8
EN00 / P5.4	25	26	EN10 / P5.6
SDI0 / P5.5	27	28	SDI1 / P5.7
FCLP0A / P5.1	29	30	FCLP1A / P5.15
FCLN0 / P5.10	31	32	FCLN1 / P5.14
SOP0A / P5.9	33	34	SOP1A / P5.13
SON0 / P5.8	35	36	SON1 / P5.12
RXCAN3 / P6.14	37	38	TXCAN3 / P6.15
SLSI0 / P10.2	39	40	SLSI1 / P6.7
SLSO0 / P10.4	41	42	SLSO1 / P10.5
SLSO2 / P2.2	43	44	SLSO3 / P2.3
SLSO4 / P2.4	45	46	SLSO5 / P2.5
SLSO6 / P2.6	47	48	SLSO7 / P2.7
GND	49	50	GND
XTAL1	51	52	EXTCLK0 / P1.12
XTAL2	53	54	BFCLKI
RXD0 / P5.0	55	56	RXD1 / P5.2
TXD0 / P5.1	57	58	TXD1 / P5.3
RXDCAN0 / P6.8	59	60	RXDCAN1 / P6.10
TXDCAN0 / P6.9	61	62	TXDCAN1 / P6.11
SCLK0 / P10.3	63	64	SCLK1 / P6.6
MTSR0 / P10.1	65	66	MTSR1 / P6.4
MRST0 / P10.0	67	68	MRST1 / P6.5
RXDCAN2 / P6.12	69	70	TXDCAN2 / P6.13
REQ0 / P1.0	71	72	REQ1 / P1.1
REQ2 / P1.2	73	74	REQ3 / P1.3
VDDESB	75	76	GND
3V3	77	78	3V3
3V3	79	80	3V3

Figure 7-1 Connector for TC1798 - Pinout (Part I, Top View)

ADC (X803, X903)

Signal	Pin	Pin	Signal
VSSM	1	2	VSSM
VSSM	3	4	VSSM
AN0	5	6	AN16
AN1	7	8	AN17
AN2	9	10	AN18
AN3	11	12	AN19
AN4	13	14	AN20
AN5	15	16	AN21
AN6	17	18	AN22
AN7	19	20	AN23
AN8	21	22	AN24
AN9	23	24	AN25
AN10	25	26	AN26
AN11	27	28	AN27
AN12	29	30	AN28
AN13	31	32	AN29
AN14	33	34	AN30
AN15	35	36	AN31
VSSM	37	38	VSSMF
VDDM	39	40	VDDMF
VFAGND	41	42	VFAREF
VAGND0	43	44	VAGND1
VAREF0	45	46	VAREF1
VSSM	47	48	VSSM
AN32	49	50	AN38
AN33	51	52	AN39
AN34	53	54	AN40
AN35	55	56	AN41
AN36	57	58	AN42
AN37	59	60	AN43
VSSM	61	62	VSSM
P0.8	63	64	P0.9
P0.10	65	66	P0.11
P0.12	67	68	P0.13
3V3	69	70	3V3
AD0EMUX0 / P7.2	71	72	AD1EMUX0 / P7.6
AD0EMUX1 / P7.3	73	74	AD1EMUX1 / P7.7
REQ5 / P7.1	75	76	P0.14
P0.15	77	78	REQ4 / P7.0
REQ7 / P7.5	79	80	REQ6 / P7.4

GPTA / MLI (X804,X904)

Signal	Pin	Pin	Signal
GND	1	2	GND
GND	3	4	GND
GPTA0 / P2.8	5	6	GPTA32 / P4.8
GPTA1 / P2.9	7	8	GPTA33 / P4.9
GPTA2 / P2.10	9	10	GPTA34 / P4.10
GPTA3 / P2.11	11	12	GPTA35 / P4.11
GPTA4 / P2.12	13	14	GPTA36 / P4.12
GPTA5 / P2.13	15	16	GPTA37 / P4.13
GPTA6 / P2.14	17	18	GPTA38 / P4.14
GPTA7 / P2.15	19	20	GPTA39 / P4.15
GPTA8 / P3.0	21	22	GPTA40 / P8.0
GPTA9 / P3.1	23	24	GPTA41 / P8.1
GPTA10 / P3.2	25	26	GPTA42 / P8.2
GPTA11 / P3.3	27	28	GPTA43 / P8.3
GPTA12 / P3.4	29	30	GPTA44 / P8.4
GPTA13 / P3.5	31	32	GPTA45 / P8.5
GPTA14 / P3.6	33	34	GPTA46 / P8.6
GPTA15 / P3.7	35	36	GPTA47 / P8.7
GPTA16 / P3.8	37	38	GPTA48 / P9.0
GPTA17 / P3.9	39	40	GPTA49 / P9.1
GPTA18 / P3.10	41	42	GPTA50 / P9.2
GPTA19 / P3.11	43	44	GPTA51 / P9.3
GPTA20 / P3.12	45	46	GPTA52 / P9.4
GPTA21 / P3.13	47	48	GPTA53 / P9.5
GPTA22 / P3.14	49	50	GPTA54 / P9.6
GPTA23 / P3.15	51	52	GPTA55 / P9.7
GPTA24 / P4.0	53	54	P9.8
GPTA25 / P4.1	55	56	P9.9
GPTA26 / P4.2	57	58	EMGSTOP / P9.10
GPTA27 / P4.3	59	60	P9.11
GPTA28 / P4.4	61	62	P9.12
GPTA29 / P4.5	63	64	P1.13
GPTA30 / P4.6	65	66	P1.14
GPTA31 / P4.7	67	68	P1.15
TCLK0 / P1.4	69	70	RDATA0 / P1.11
TREADY0 / P1.5	71	72	RVALID0 / P1.10
TVALID0 / P1.6	73	74	RREADY0 / P1.9
TDATA0 / P1.7	75	76	RCLK0 / P1.8
3V3	77	78	3V3
3V3	79	80	3V3

Figure 7-2 Connector for TC1798 - Pinout (Part II, Top View)

ADC_2 (X805, X905)

VSSM	1	2	VSSM
VSSM	3	4	VSSM
AN44	5	6	AN60
AN45	7	8	AN61
AN46	9	10	AN62
AN47	11	12	AN63
AN48	13	14	AN64
AN49	15	16	AN65
AN50	17	18	AN66
AN51	19	20	AN67
AN52	21	22	AN68
AN53	23	24	AN69
AN54	25	26	AN70
AN55	27	28	AN71
AN56	29	30	
AN57	31	32	
AN58	33	34	
AN59	35	36	
	37	38	
	39	40	
	41	42	
VAGND2	43	44	VAGND3
VAREF2	45	46	VAREF3
VSSM	47	48	VSSM
	49	50	
	51	52	
	53	54	
	55	56	
	57	58	
	59	60	
VSSM	61	62	VSSM
P0.0	63	64	P0.3
P0.1	65	66	P0.4
P0.2	67	68	CKE
3V3	69	70	3V3
DSQ2	71	72	DSQ3
P18.0	73	74	P18.4
P18.1	75	76	P18.5
P18.2	77	78	P18.6
P18.3	79	80	P18.7

Figure 7-3 Connector for TC1798 - Pinout (Part III, Top View)

7.2 Power connector pinout

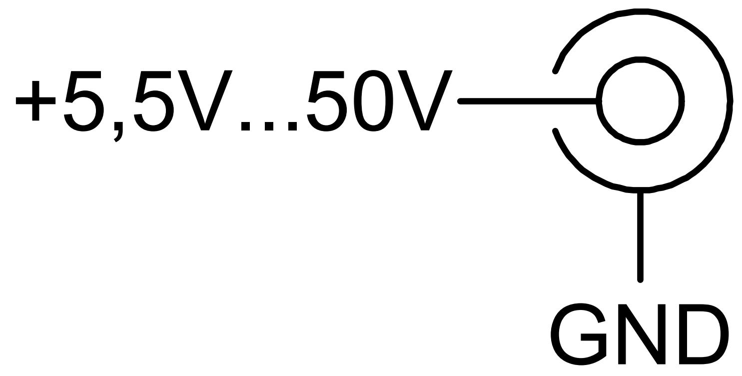


Figure 7-4 Power connector pinout

7.3 USB connector pinout

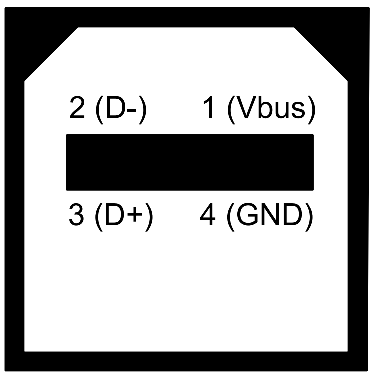


Figure 7-5 USB connector Pinout

7.4 Flexray Pinout

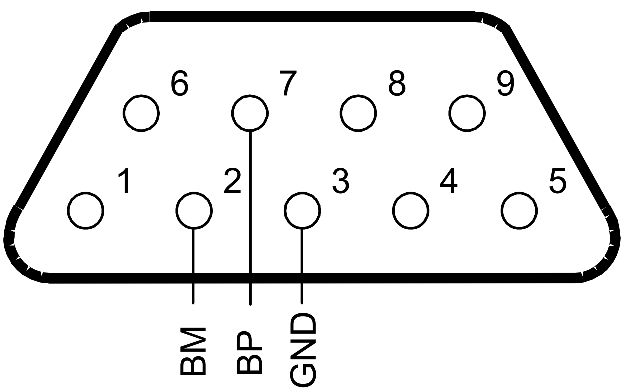


Figure 7-6 Flexray Pinout (SUBD-9 Plug)

7.5 CAN connector pinout

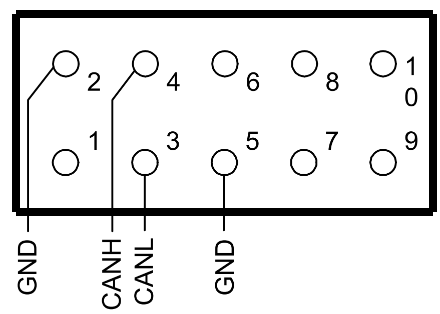


Figure 7-7 CAN connector pinout (IDC10)

7.6 OCDS connector pinout

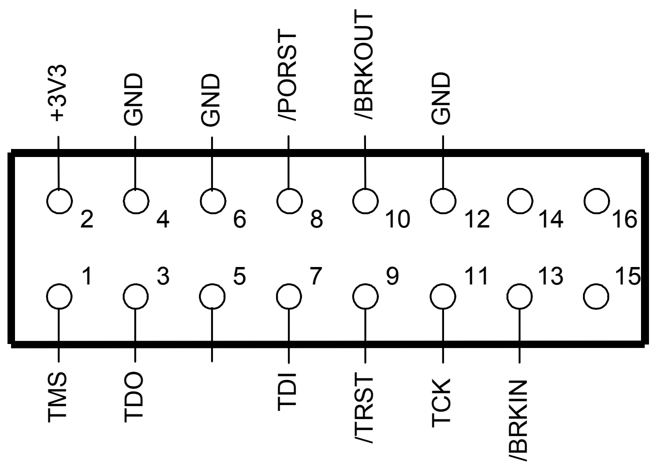


Figure 7-8 OCDS connector pinout (IDC16)

7.7 DAP connector pinout

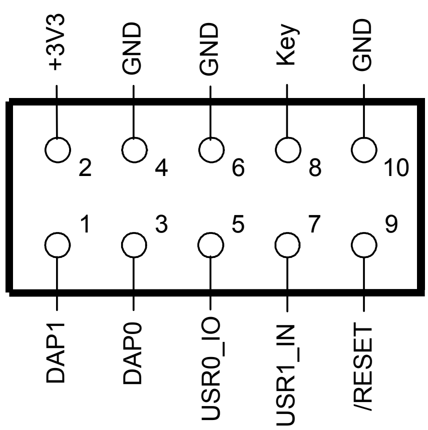


Figure 7-9 DAP connector pinout (FTSH10)

8 Schematic and Layout

8.1 Schematic

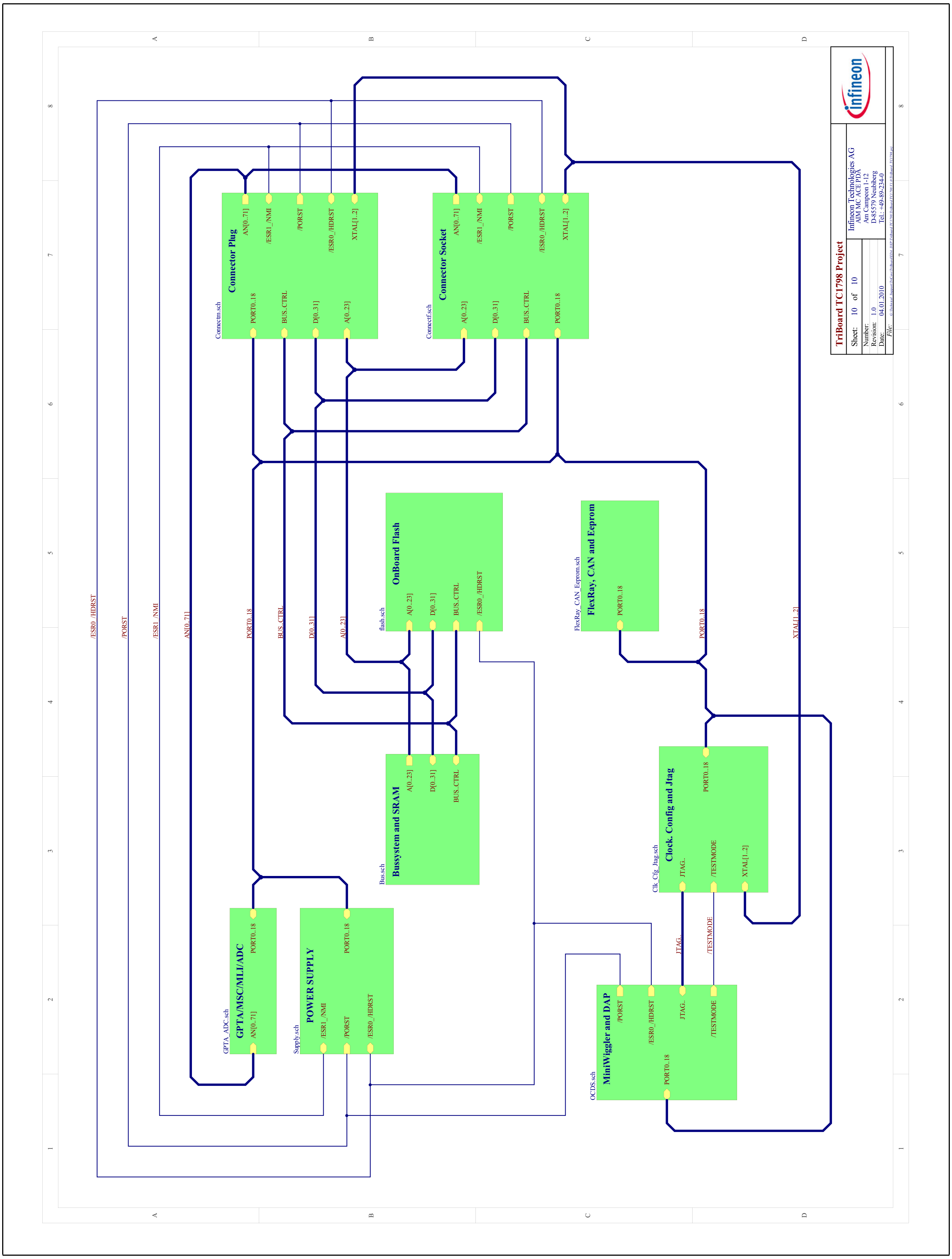


Figure 8-1 Schematic - Project

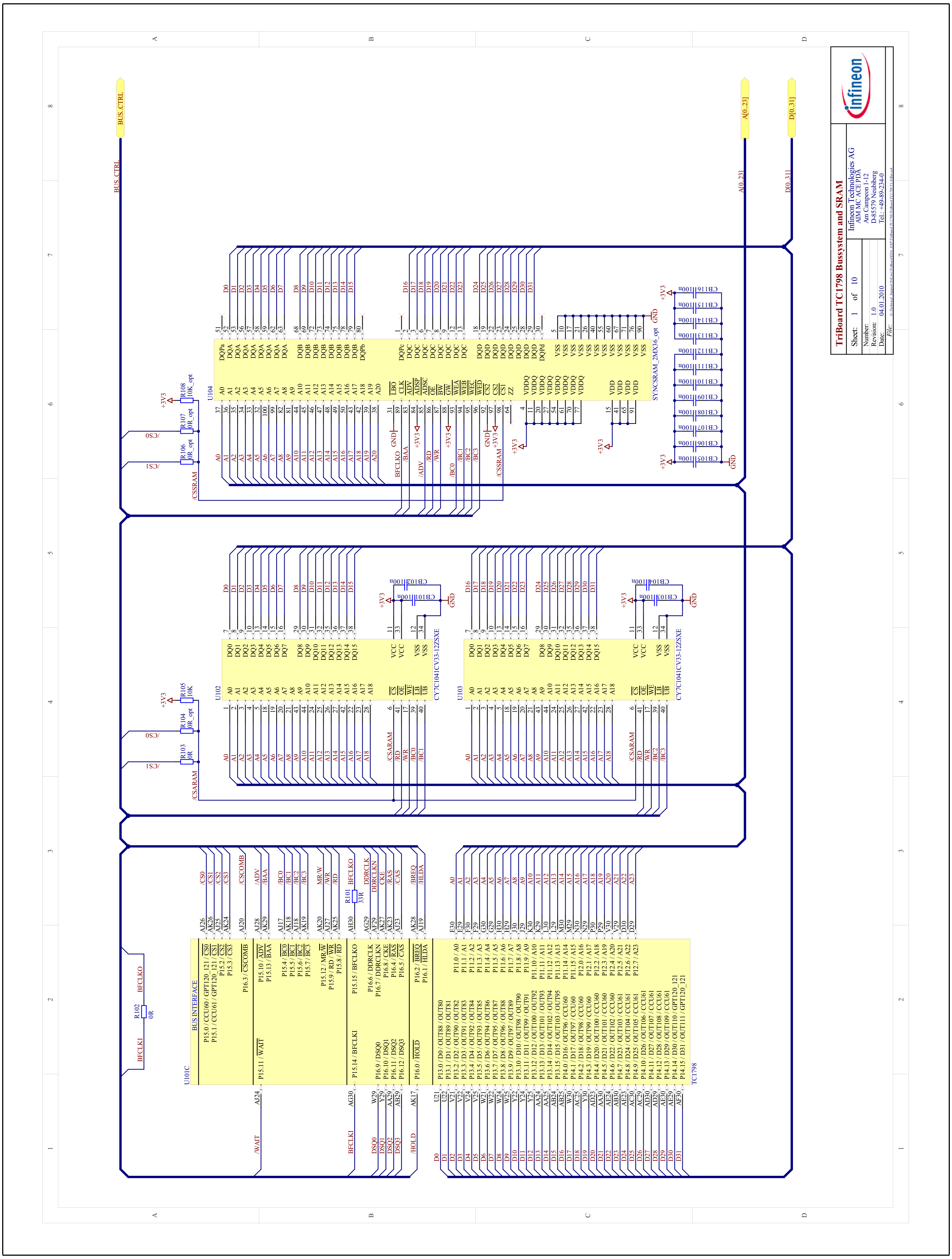


Figure 8-2 Schematic - Bussystem and SRAM

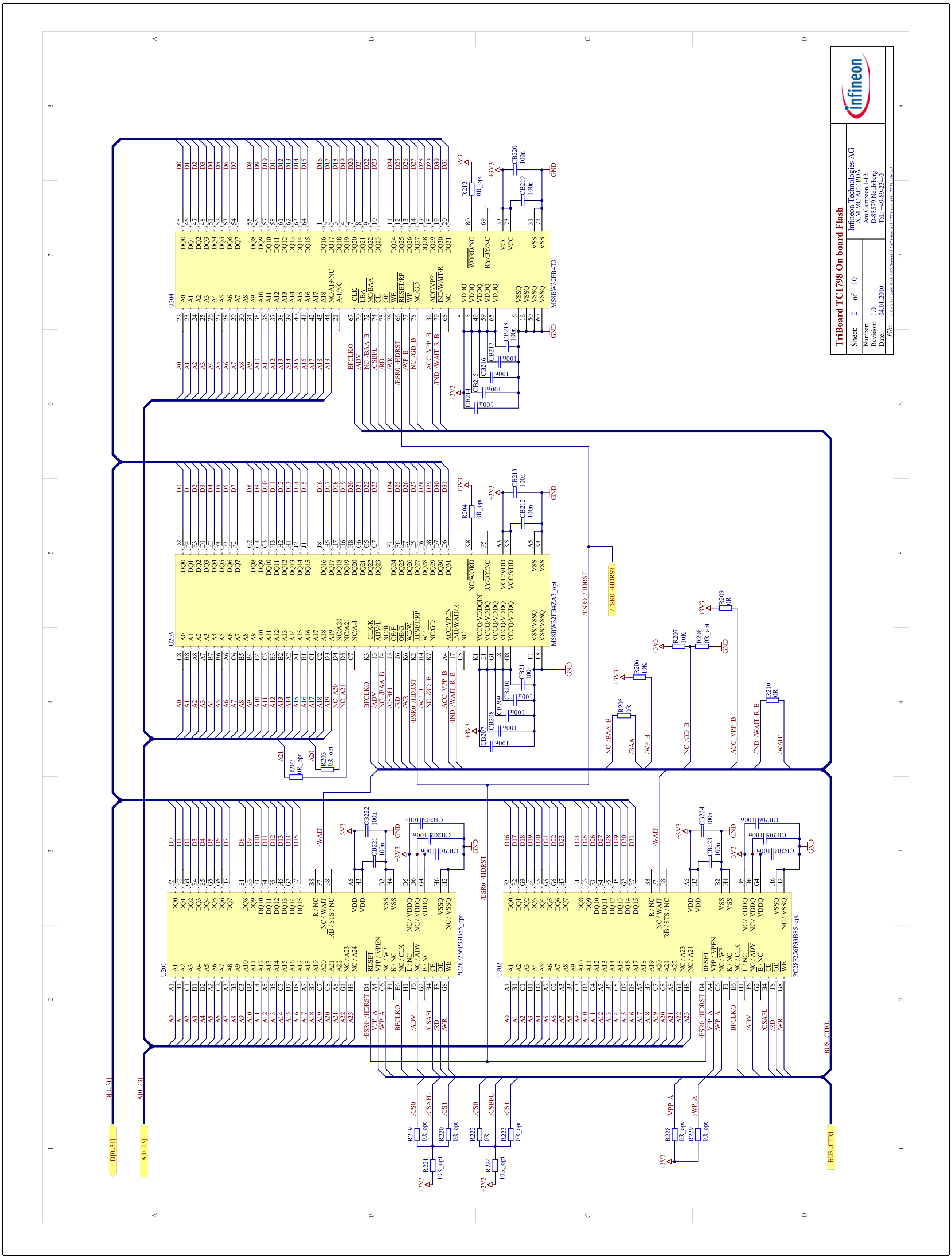


Figure 8-3 Schematic - On Board Flash Memory

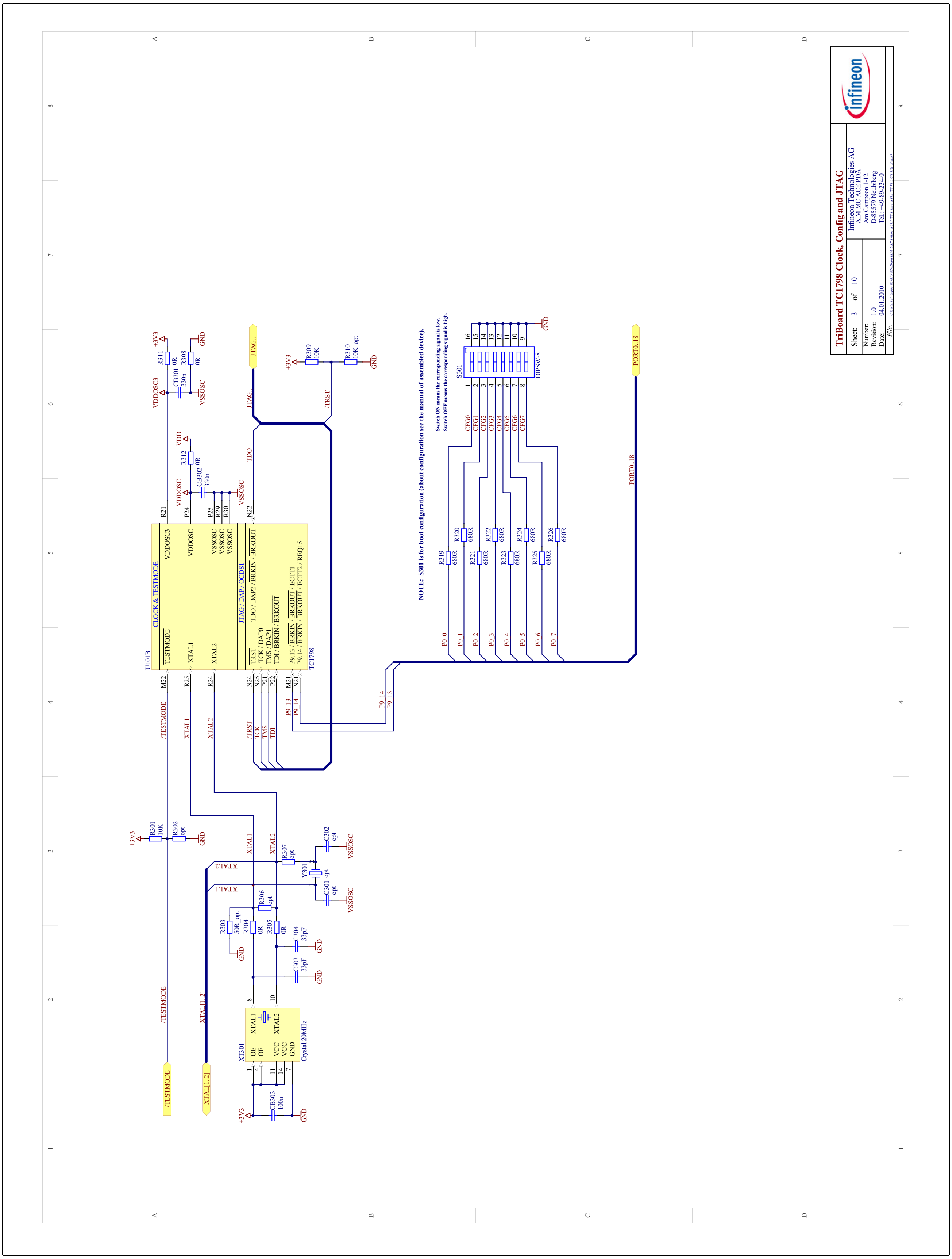


Figure 8-4 Schematic - Clock, Config and Jtag

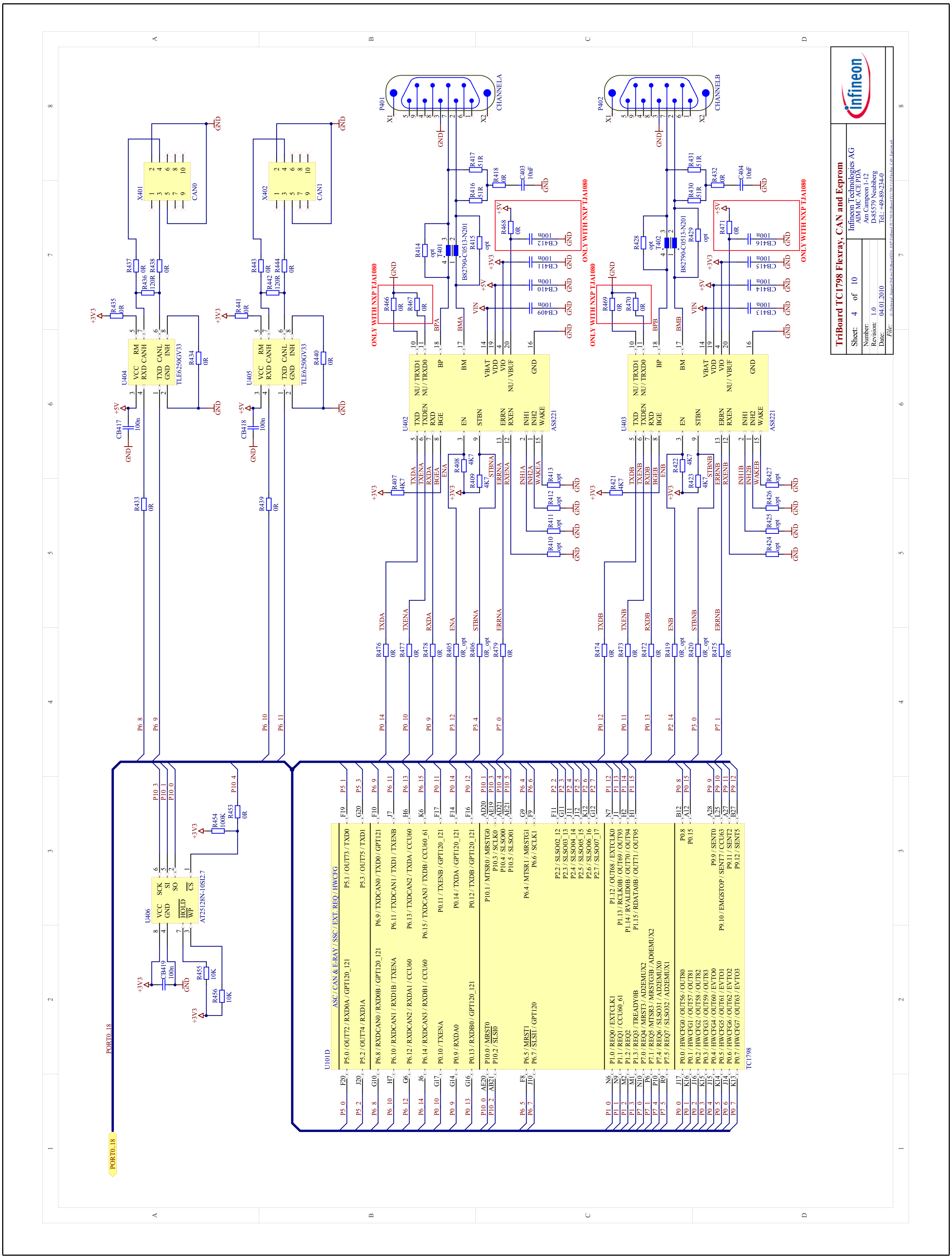


Figure 8-5 Schematic - FlexRay, CAN and Eeprom

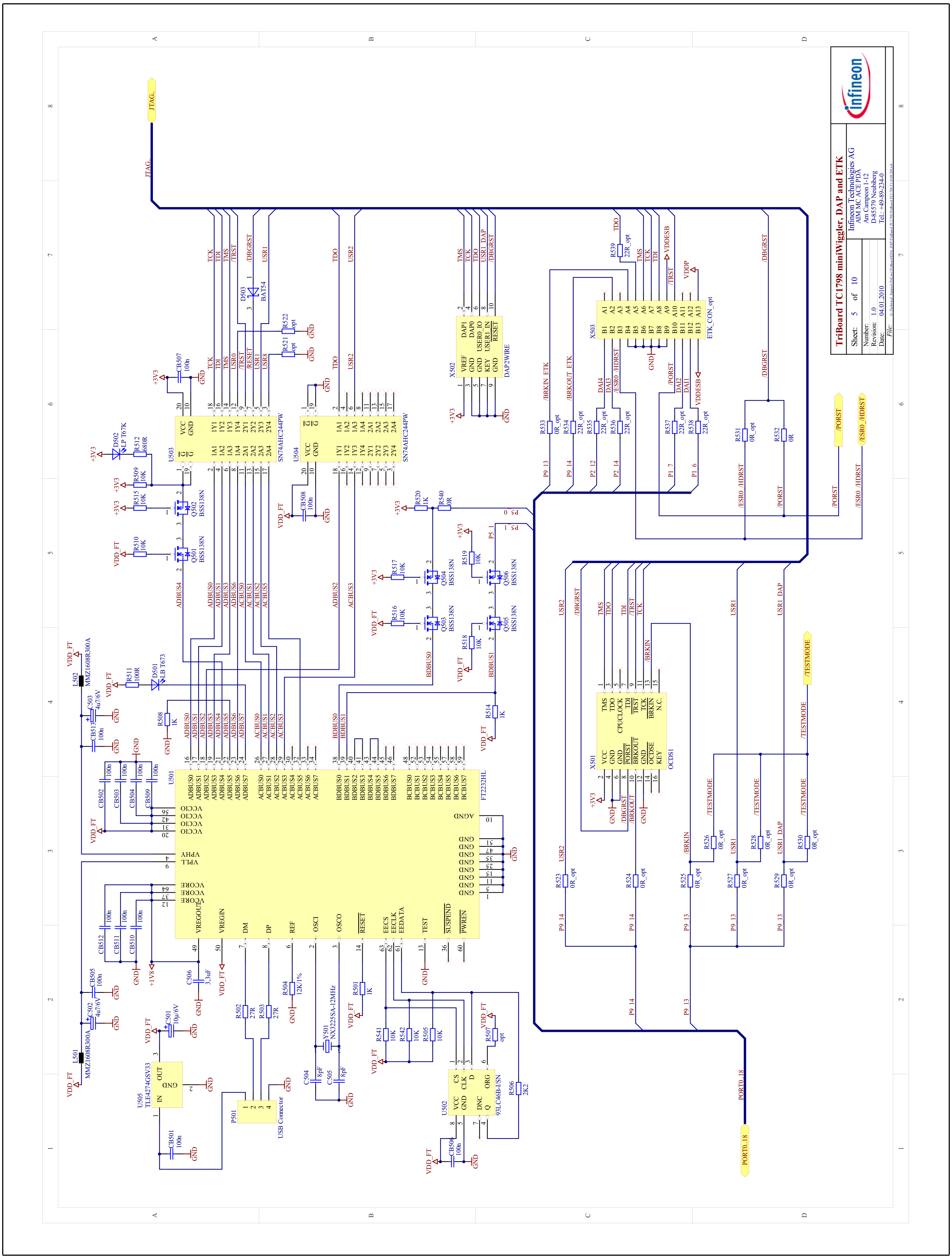


Figure 8-6 Schematic - miniWiggler JDS, DAP and ETK

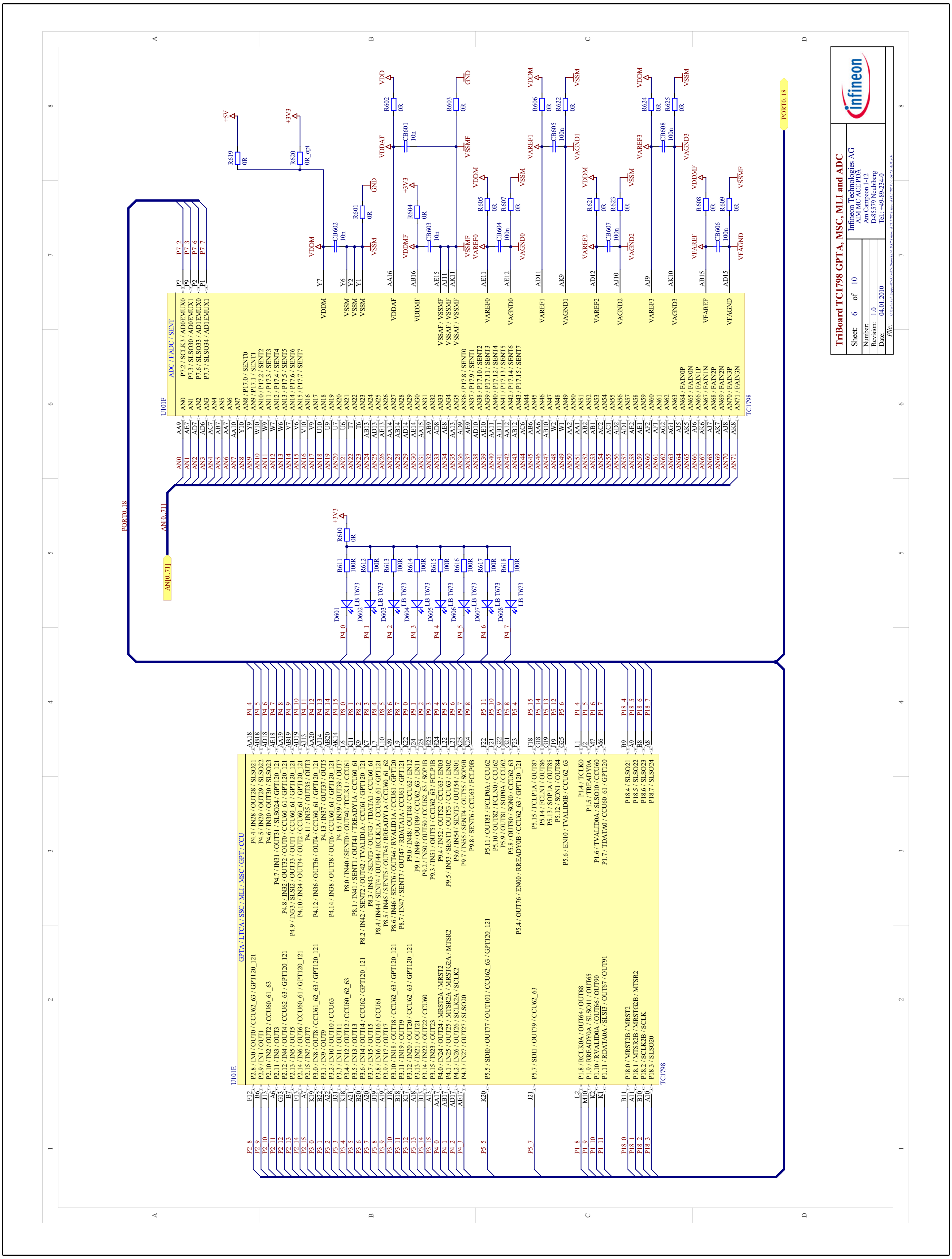


Figure 8-7 Schematic - GPTA, MSC, MLI and ADC

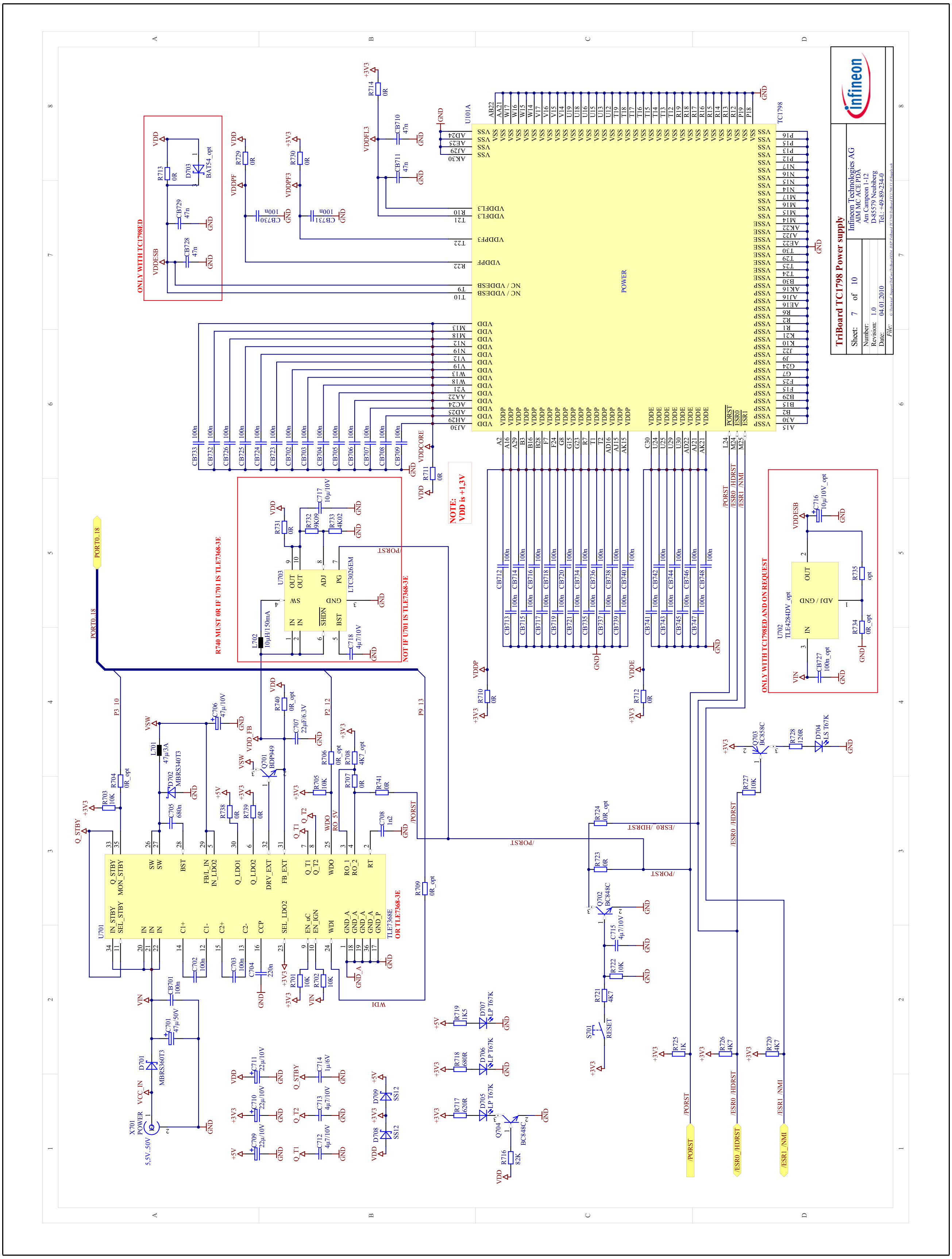


Figure 8-8 Schematic - Power Supply

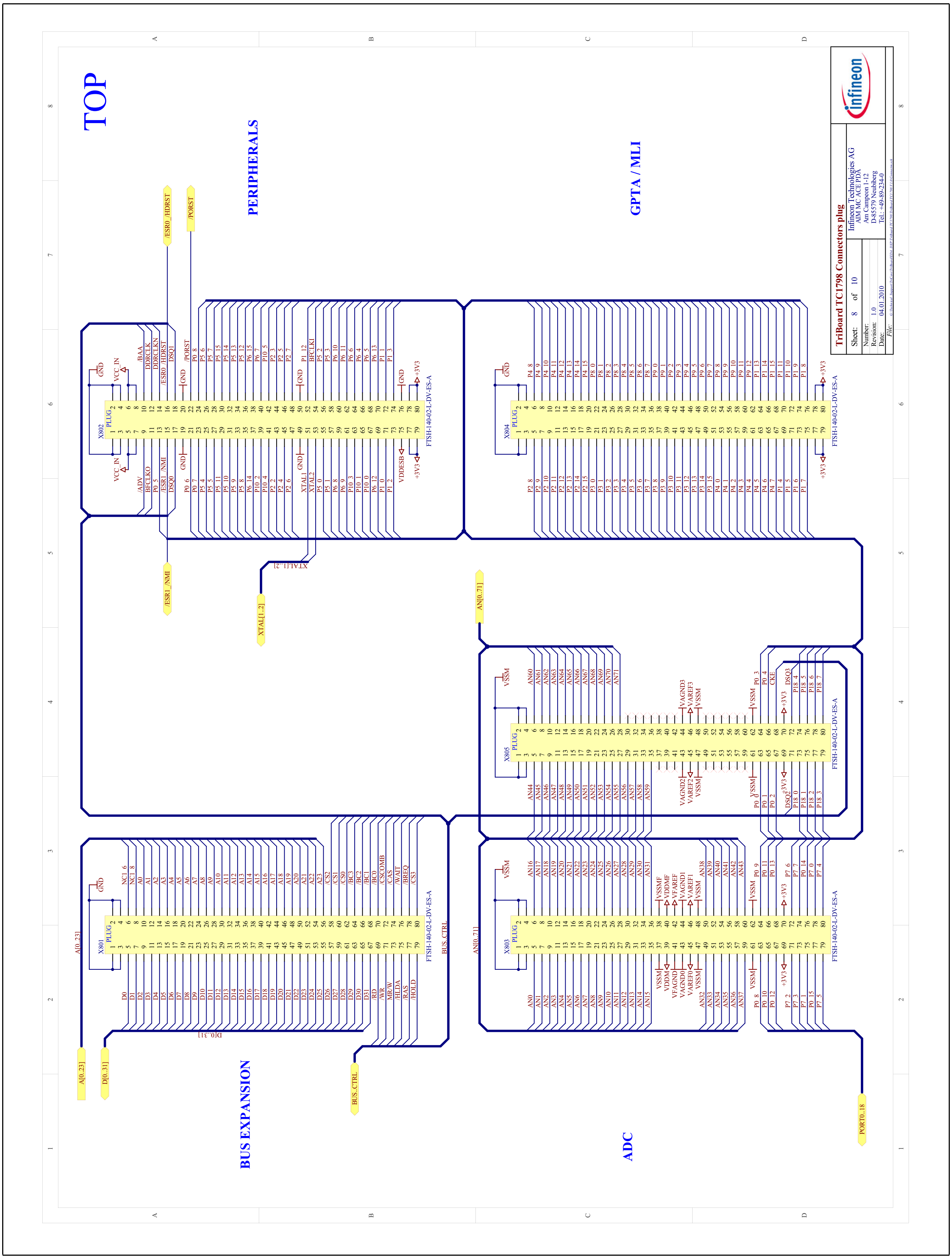


Figure 8-9 Schematic - Connectors (Plug)

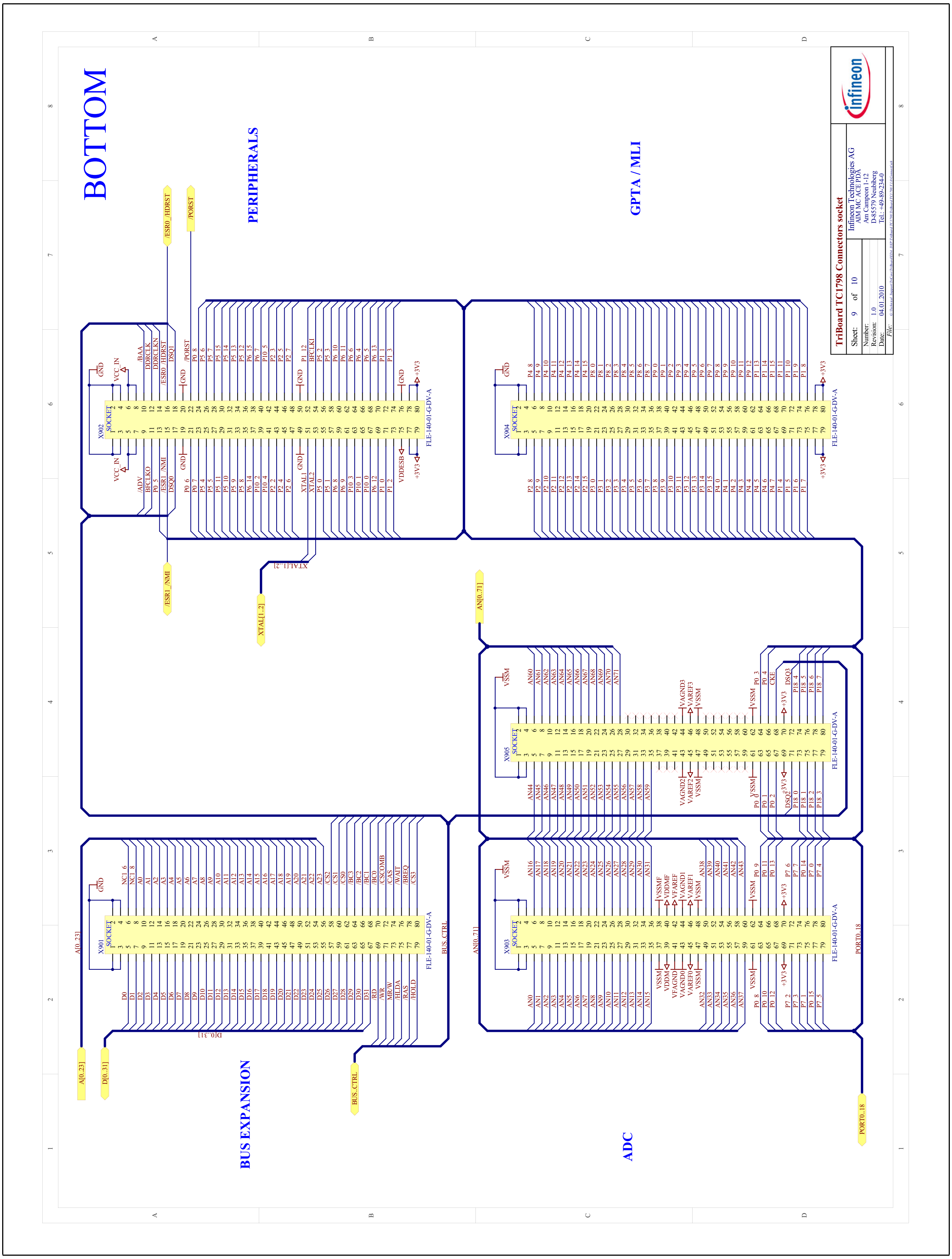


Figure 8-10 Schematic - Connectors (Socket)

8.2 Layout

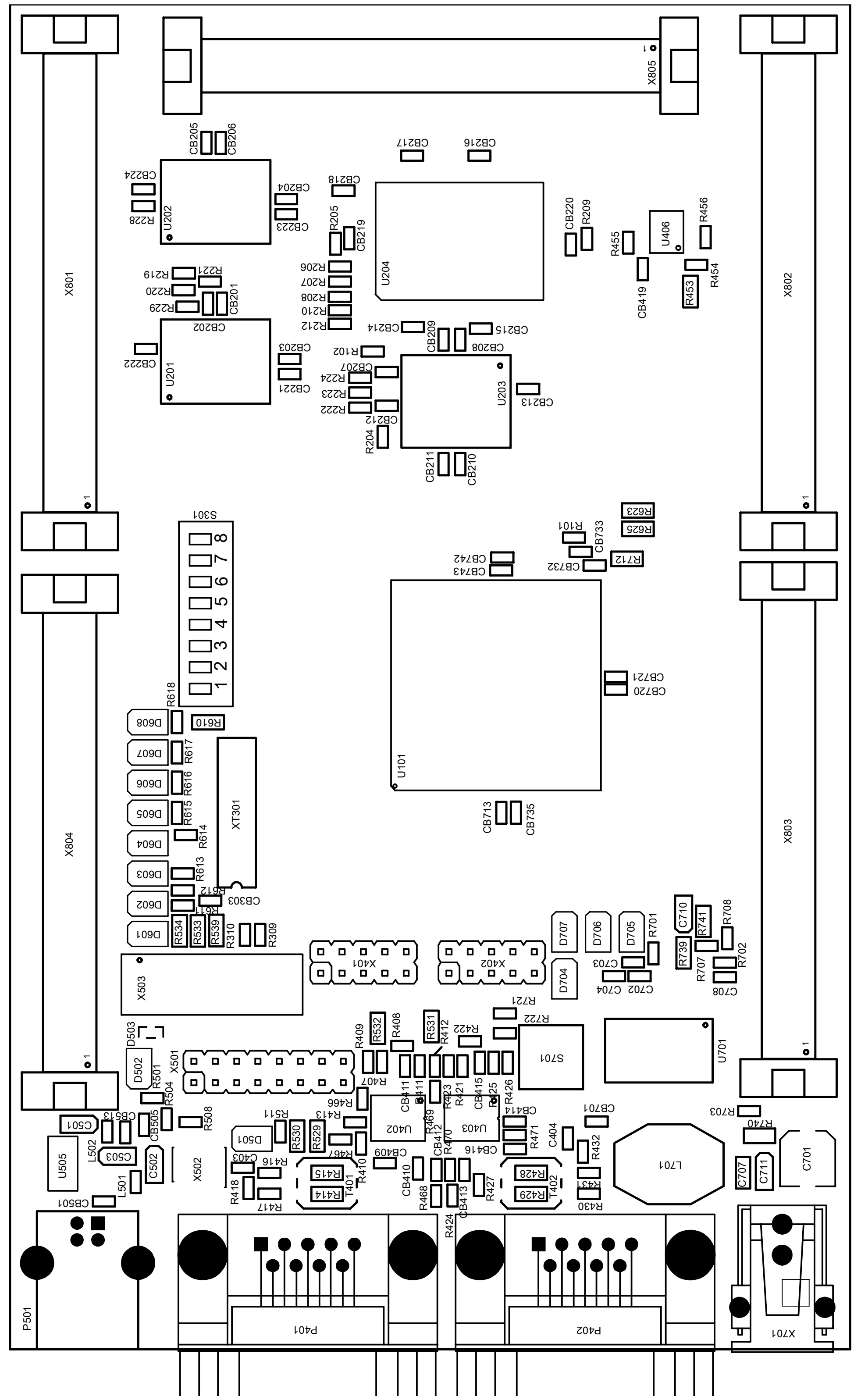


Figure 8-11 Component Plot Top Layer

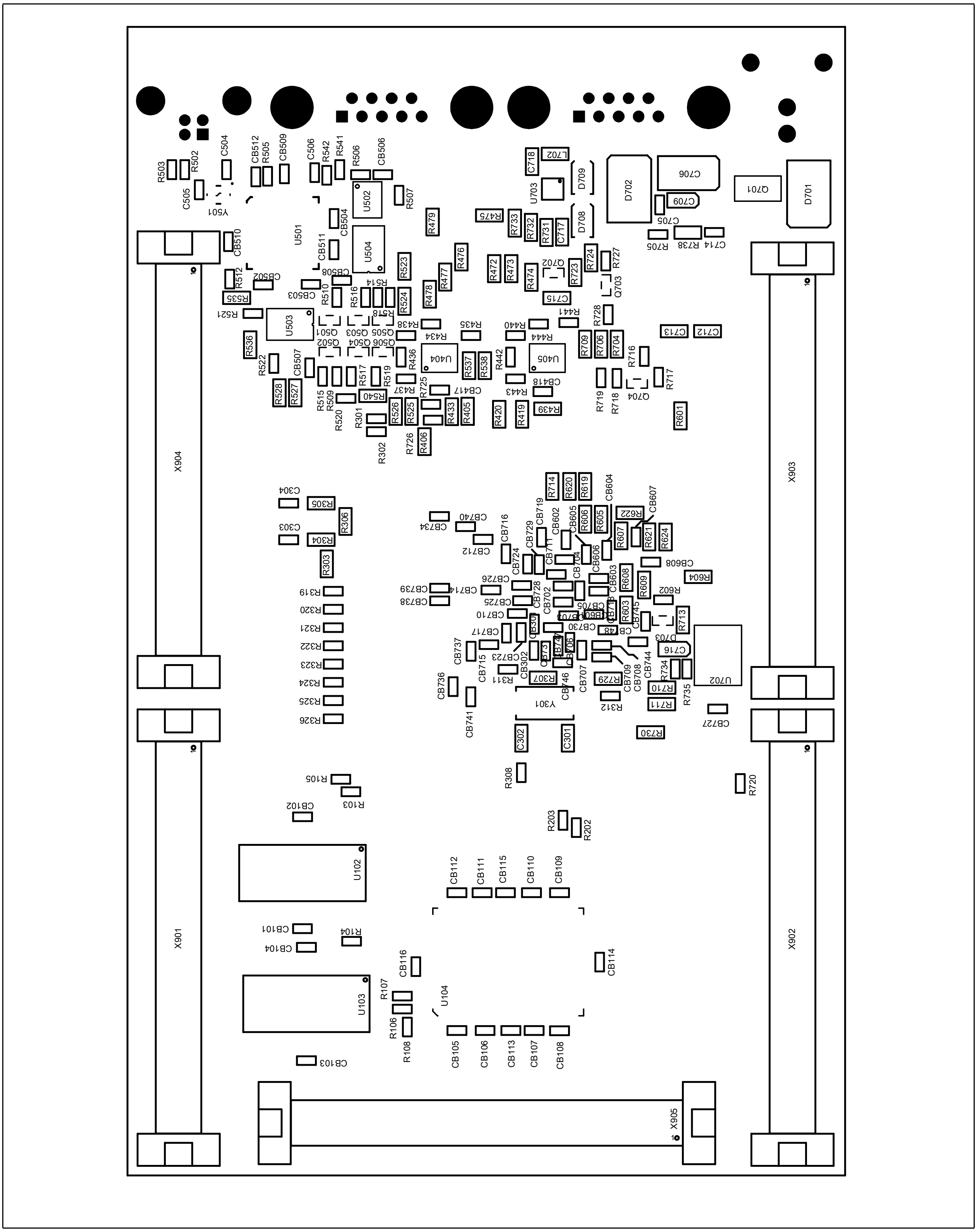


Figure 8-12 Component Plot Bottom Layer

8.3 Layout with Dimensioning

The following dimensions should be used for development of extension boards..

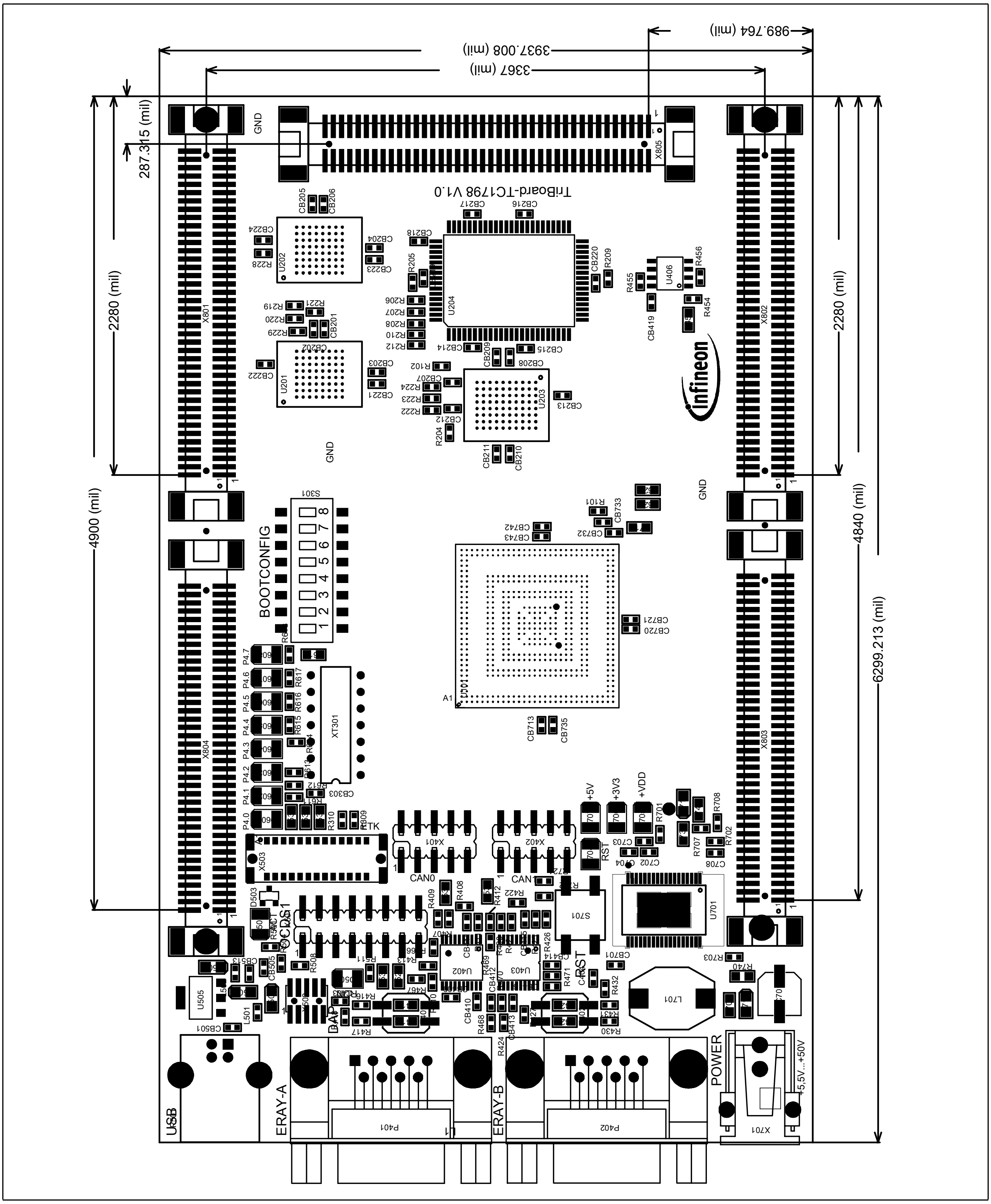


Figure 8-13 Dimensioning (mil)

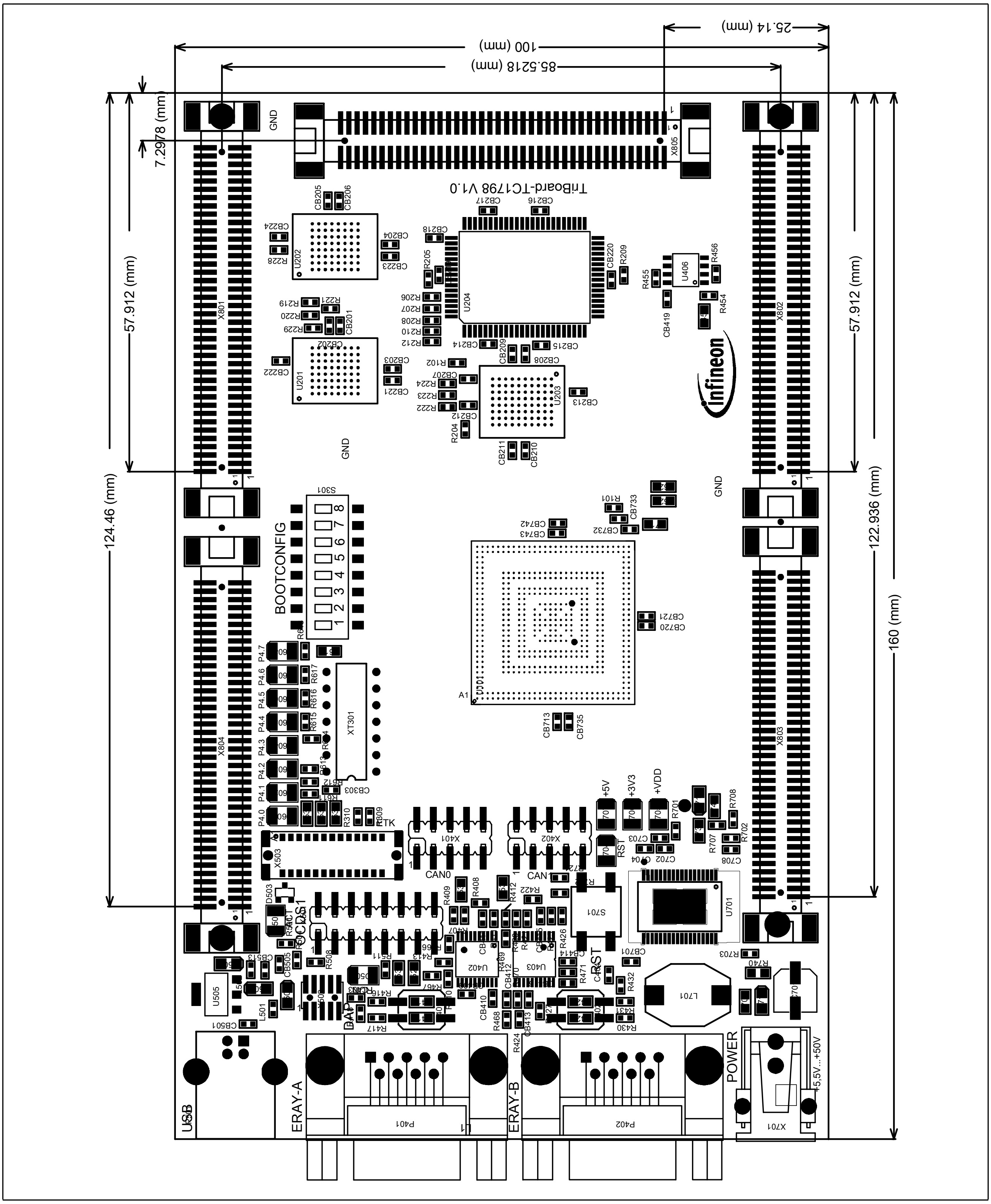


Figure 8-14 Dimensioning (mm)

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